한 번에 끝내는 블록체인 개발 A to Z

Chapter 1

Rust Introduction

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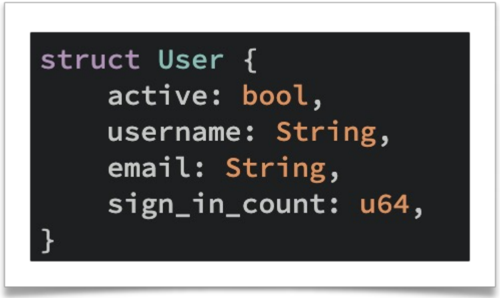
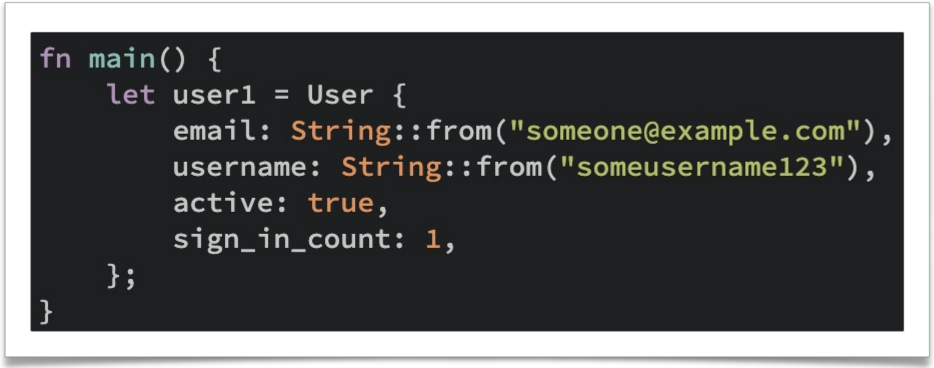
Struct

Defining and Instantiating Structs

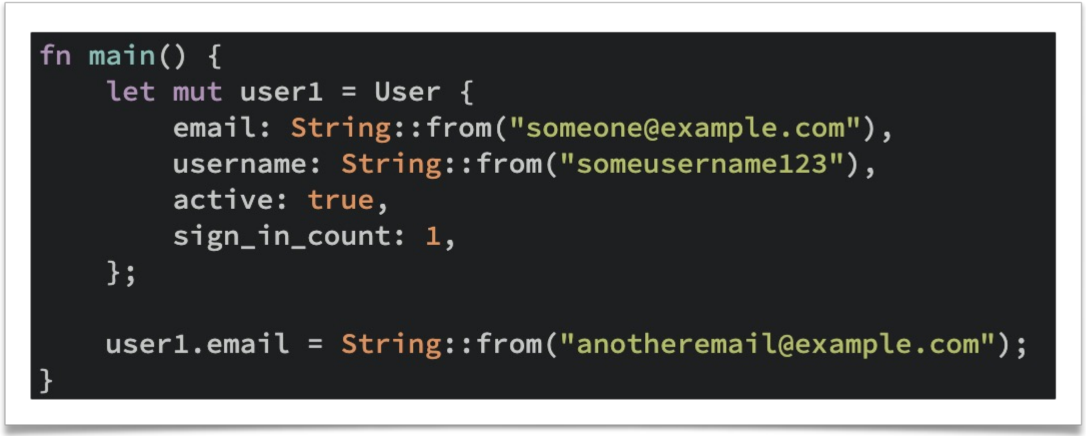
Defining & Instantiating



```
struct User {
    active: bool,
    username: String,
    email: String,
    sign_in_count: u64,
}
```

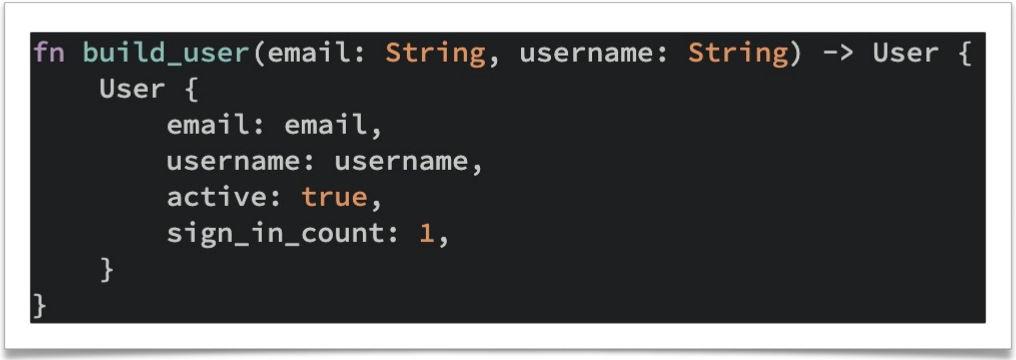


```
fn main() {
    let user1 = User {
        email: String::from("someone@example.com"),
        username: String::from("someusername123"),
        active: true,
        sign_in_count: 1,
    };
}
```

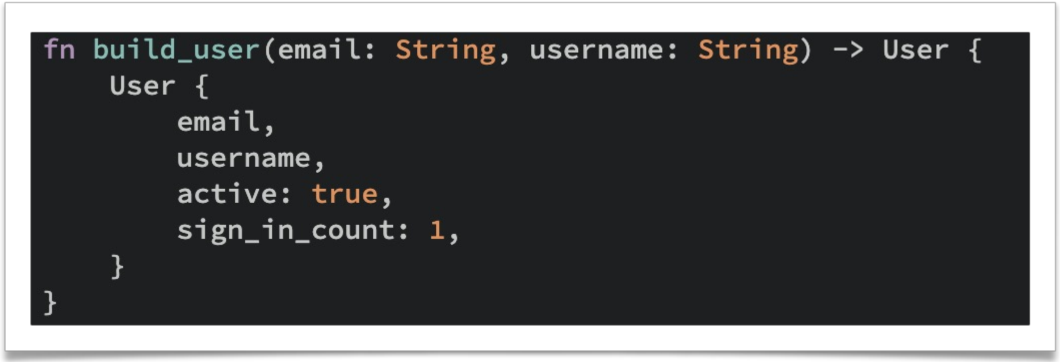


```
fn main() {
    let mut user1 = User {
        email: String::from("someone@example.com"),
        username: String::from("someusername123"),
        active: true,
        sign_in_count: 1,
    };

    user1.email = String::from("anotheremail@example.com");
}
```

Using the Field Init Shorthand

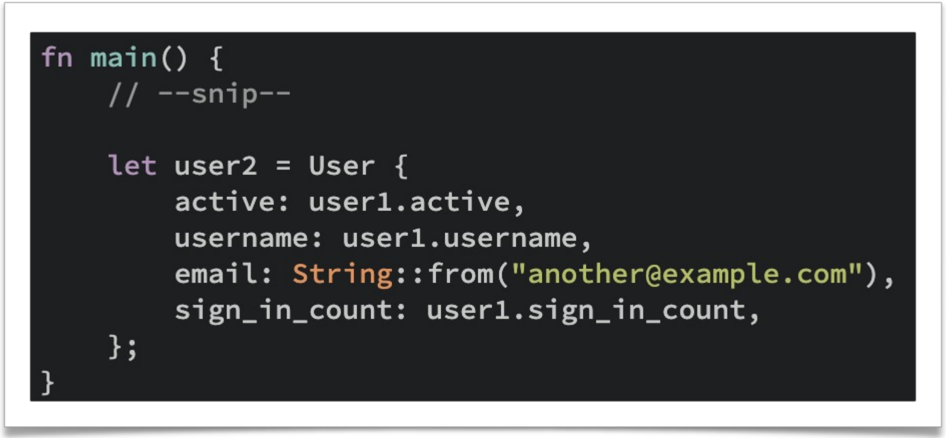


```
fn build_user(email: String, username: String) -> User {
    User {
        email: email,
        username: username,
        active: true,
        sign_in_count: 1,
    }
}
```

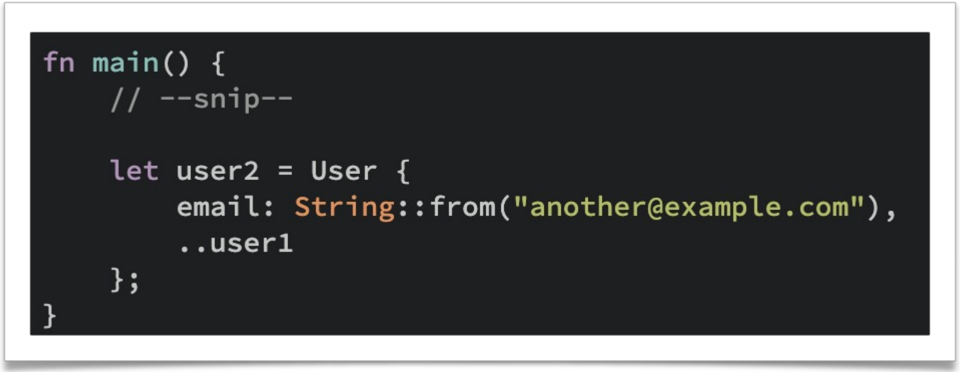


```
fn build_user(email: String, username: String) -> User {
    User {
        email,
        username,
        active: true,
        sign_in_count: 1,
    }
}
```

Creating Instances From Other Instances

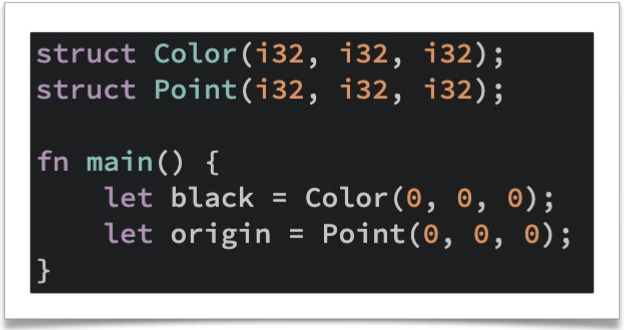


```
fn main() {
    // --snip--

    let user2 = User {
        active: user1.active,
        username: user1.username,
        email: String::from("another@example.com"),
        sign_in_count: user1.sign_in_count,
    };
}
```

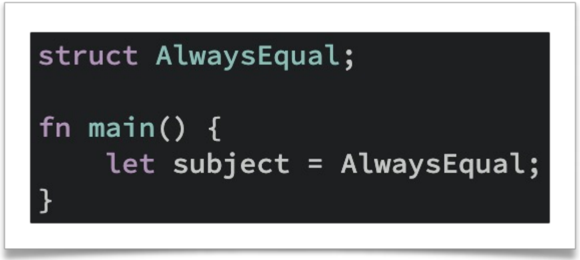


```
fn main() {
    // --snip--

    let user2 = User {
        email: String::from("another@example.com"),
        ..user1
    };
}
```

Tuple Structs
Unit-Like Structs



```
struct Color(i32, i32, i32);
struct Point(i32, i32, i32);

fn main() {
    let black = Color(0, 0, 0);
    let origin = Point(0, 0, 0);
}
```

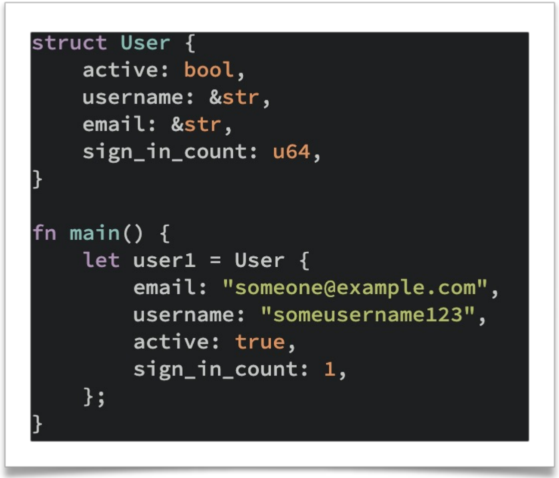


```
struct AlwaysEqual;

fn main() {
    let subject = AlwaysEqual;
}
```

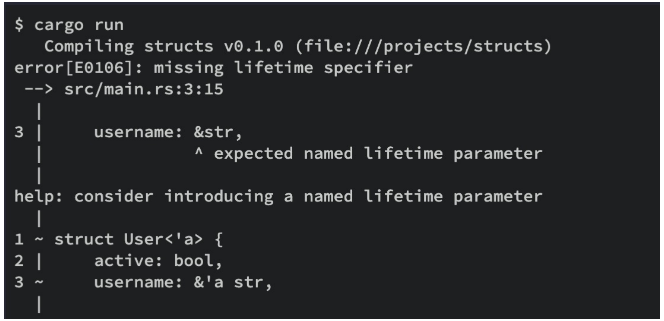
Unit-like structs can be useful when you need to implement a trait on some type but don’t have any data that you want to store in the type itself.

Ownership of Struct Data

It’s also possible for structs to store references to data owned by something else, but to do so requires the use of lifetimes (discussed later).



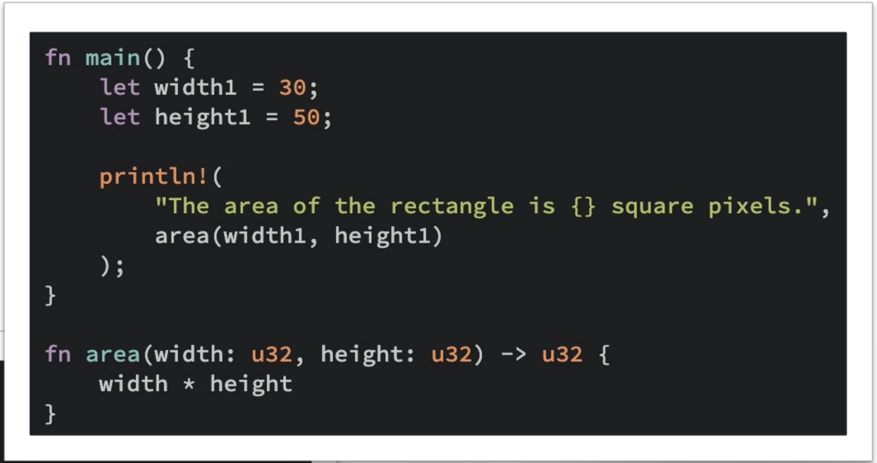
```
struct User {
    active: bool,
    username: &str,
    email: &str,
    sign_in_count: u64,
}

fn main() {
    let user1 = User {
        email: "someone@example.com",
        username: "someusername123",
        active: true,
        sign_in_count: 1,
    };
}
```



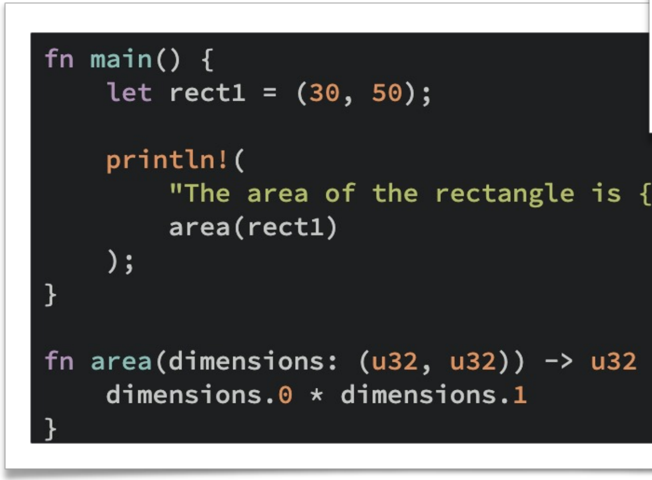
```
$ cargo run
   Compiling structs v0.1.0 (file:///projects/structs)
error[E0106]: missing lifetime specifier
 --> src/main.rs:3:15
  |
3 |     username: &str,
  |               ^ expected named lifetime parameter
  |
help: consider introducing a named lifetime parameter
  |
1 ~ struct User<'a> {
2 |     active: bool,
3 ~     username: &'a str,
  |
```

An Example Program Using Structs

Example

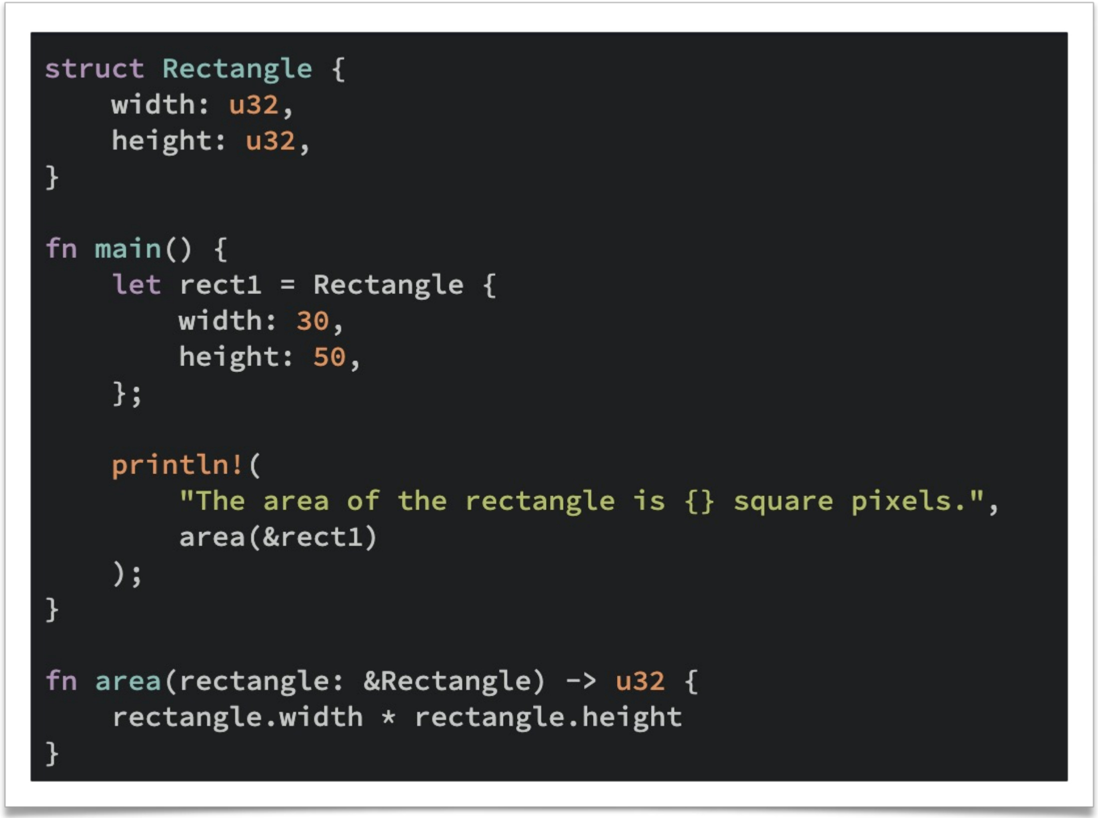


```
fn main() {
    let width1 = 30;
    let height1 = 50;

    println!(
        "The area of the rectangle is {} square pixels.",
        area(width1, height1)
    );
}

fn area(width: u32, height: u32) -> u32 {
    width * height
}
```



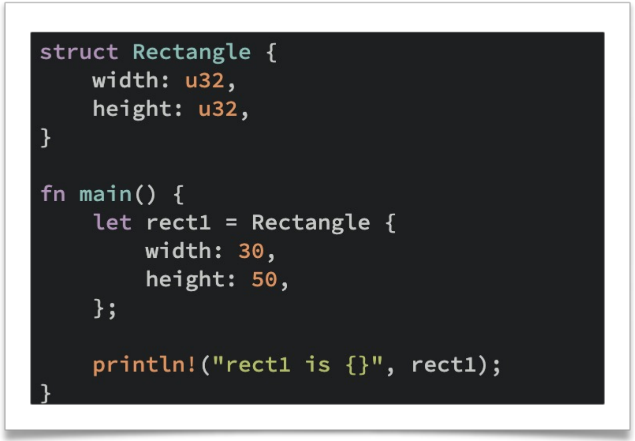
```
fn main() {
    let rect1 = (30, 50);

    println!(
        "The area of the rectangle is {} square pixels.",
        area(rect1)
    );
}

fn area(dimensions: (u32, u32)) -> u32 {
    dimensions.0 * dimensions.1
}
```

Example



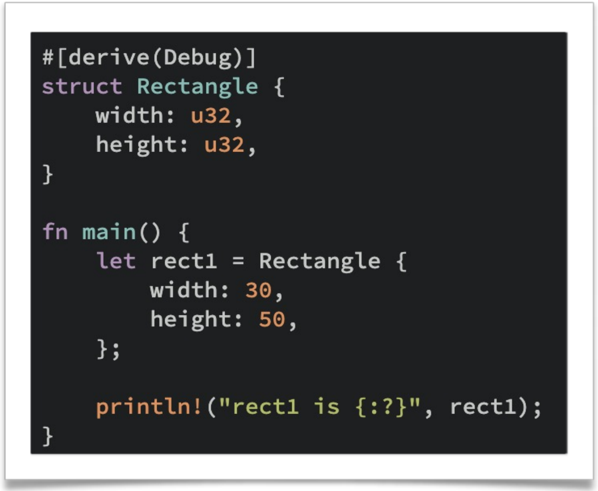
```rust
struct Rectangle {
    width: u32,
    height: u32,
}

fn main() {
    let rect1 = Rectangle {
        width: 30,
        height: 50,
    };

    println!(
        "The area of the rectangle is {} square pixels.",
        area(&rect1)
    );
}

fn area(rectangle: &Rectangle) -> u32 {
    rectangle.width * rectangle.height
}
```

Derived Traits

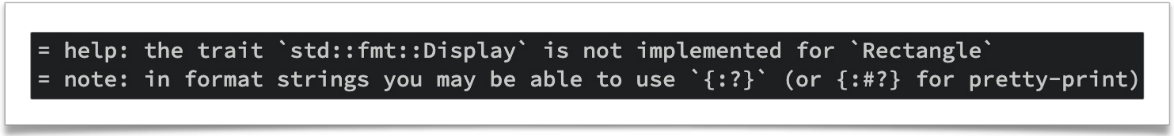


```rust
struct Rectangle {
    width: u32,
    height: u32,
}

fn main() {
    let rect1 = Rectangle {
        width: 30,
        height: 50,
    };

    println!("rect1 is {}", rect1);
}
```

→



```rust
#[derive(Debug)]
struct Rectangle {
    width: u32,
    height: u32,
}

fn main() {
    let rect1 = Rectangle {
        width: 30,
        height: 50,
    };

    println!("rect1 is {:?}", rect1);
}
```

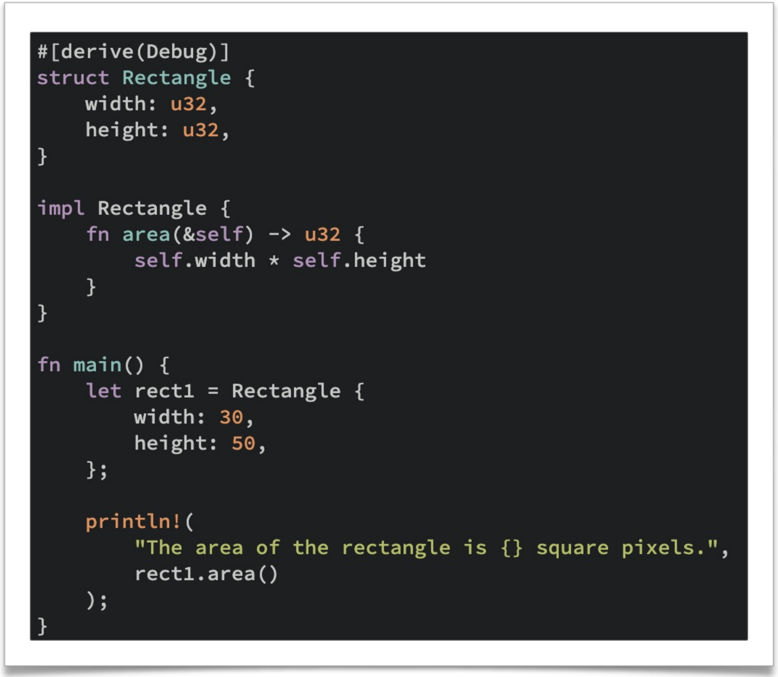


```
= help: the trait `std::fmt::Display` is not implemented for `Rectangle`
= note: in format strings you may be able to use `{:?}` (or {:#?} for pretty-print)
```

Method Syntax

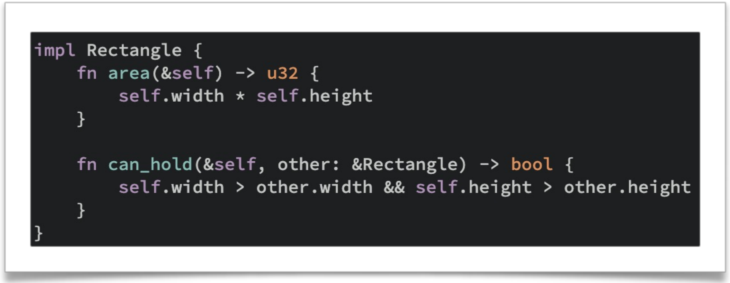
Defining Methods

We’ve chosen **&self** here for the same reason we used **&Rectangle** in the function version: we don’t want to take ownership, and we just want to read the data in the struct, not write to it. If we wanted to change the instance that we’ve called the method on as part of what the method does, we’d use **&mut self** as the first parameter. Having a method that takes ownership of the instance by using just self as the first parameter is rare; this technique is usually used when the method transforms self into something else and you want to prevent the caller from using the original instance after the transformation.

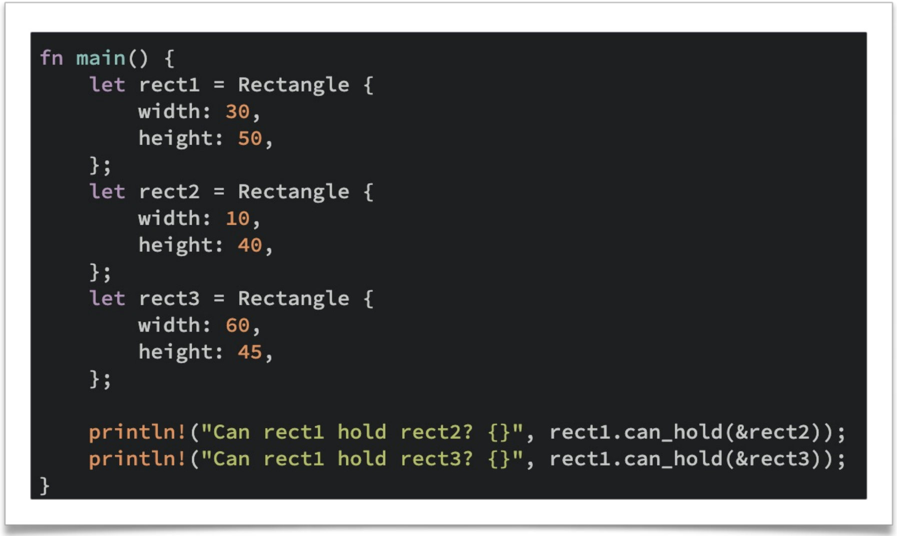


```rust
#[derive(Debug)]
struct Rectangle {
    width: u32,
    height: u32,
}

impl Rectangle {
    fn area(&self) -> u32 {
        self.width * self.height
    }
}

fn main() {
    let rect1 = Rectangle {
        width: 30,
        height: 50,
    };

    println!(
        "The area of the rectangle is {} square pixels.",
        rect1.area()
    );
}
```

More Parameters



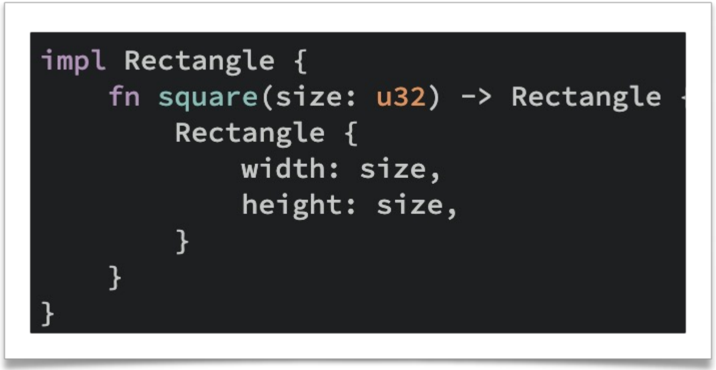
```
impl Rectangle {
    fn area(&self) -> u32 {
        self.width * self.height
    }

    fn can_hold(&self, other: &Rectangle) -> bool {
        self.width > other.width && self.height > other.height
    }
}
```



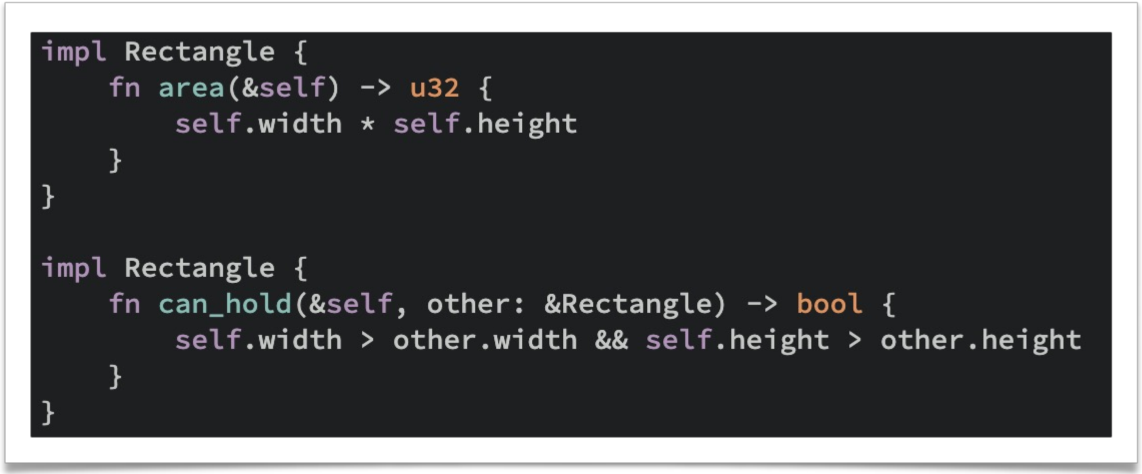
```
fn main() {
    let rect1 = Rectangle {
        width: 30,
        height: 50,
    };
    let rect2 = Rectangle {
        width: 10,
        height: 40,
    };
    let rect3 = Rectangle {
        width: 60,
        height: 45,
    };

    println!("Can rect1 hold rect2? {}", rect1.can_hold(&rect2));
    println!("Can rect1 hold rect3? {}", rect1.can_hold(&rect3));
}
```

Associated Functions

All functions defined within an impl block are called associated functions because they’re associated with the type named after the impl. We can define associated functions that don’t have self as their first parameter (and thus are not methods) because they don’t need an instance of the type to work with.



```
impl Rectangle {
    fn square(size: u32) -> Rectangle
        Rectangle {
            width: size,
            height: size,
        }
    }
}
```



```
impl Rectangle {
    fn area(&self) -> u32 {
        self.width * self.height
    }
}

impl Rectangle {
    fn can_hold(&self, other: &Rectangle) -> bool {
        self.width > other.width && self.height > other.height
    }
}
```