Einführung in Rust

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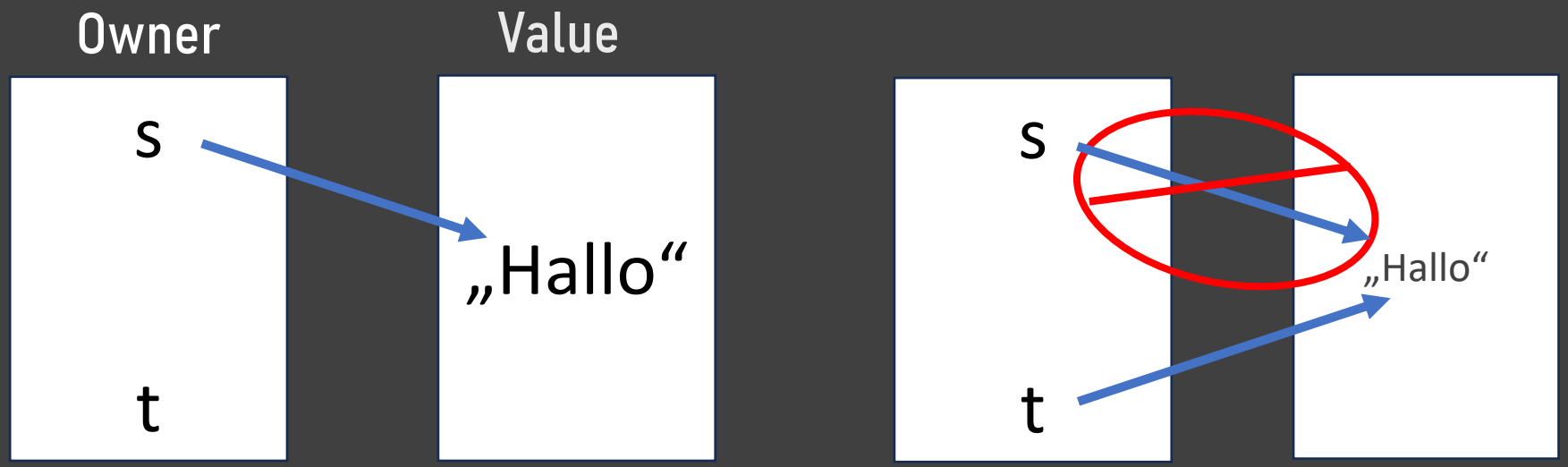
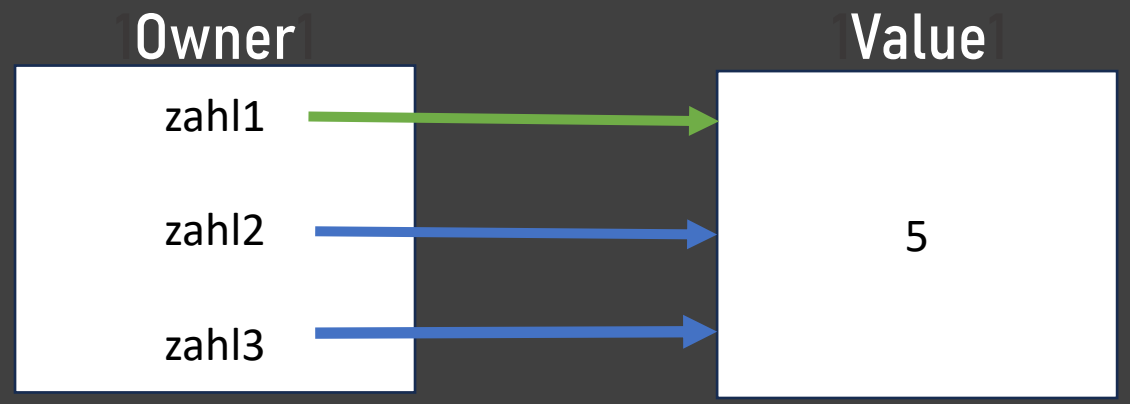
2.2. Memory Management

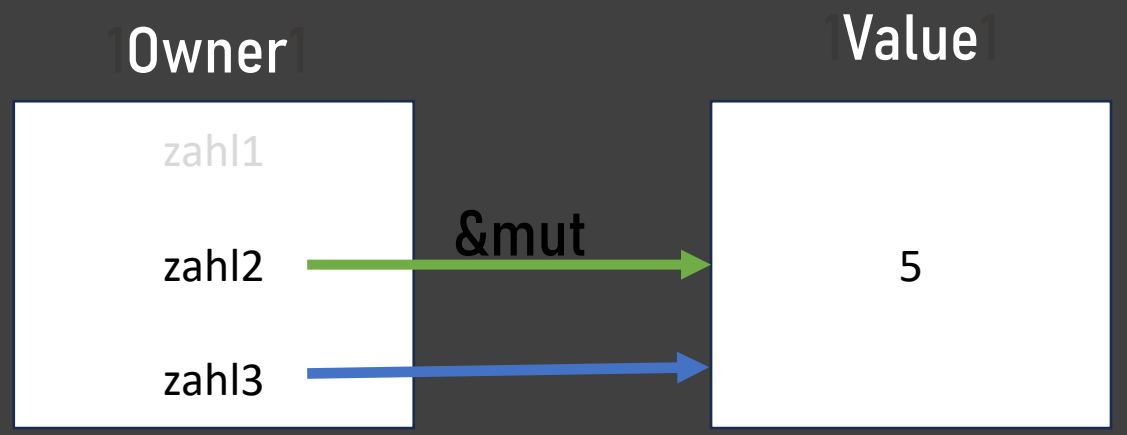


Codebeispiel:

```
let s: String = String::from("Hallo");
let t: String = s;
println!("{}", s);
```

2.3. Mutability und Borrwing





Sichert Parallelität

2.3. Fehlermanagement

Option<T>

```
Tabnine | Edit | Test | Explain | Document
fn divide(a: i32, b: i32) -> Option<i32> {
    if b == 0 {
        None
    } else {
        Some(a / b)
    }
}

Tabnine | Edit | Test | Explain | Document | ▶ Run | ⚙ Debug
fn main() {
    let result: Option<i32> = divide(a: 10, b: 2);
    match result {
        Some(value: i32) => println!("Ergebnis: {}", value),
        None => println!("Fehler: Division durch Null!"),
    }
}
```

Result<T, E>

```
use std::fs::File;
use std::io::{self, Read};

Tabnine | Edit | Test | Explain | Document
fn read_file() -> Result<String, io::Error> {
    let mut file: File = File::open(path: "test.txt")?;
    let mut content: String = String::new();
    file.read_to_string(buf: &mut content)?;
    Ok(content)
}

Tabnine | Edit | Test | Explain | Document | ▶ Run | ⚙ Debug
fn main() {
    match read_file() {
        Ok(content: String) => println!("Content: {}", content),
        Err(error: Error) => println!("Error: {}", error),
    }
}
```

Typ:	Verwendung:
Option<T>	Wert überprüfen (da, fehlt)
Result<T, E>	Kann fehlschlagen

2.4. Pattern Matching

Typsicherheit und Nullsicherheit

```
Tabnine | Edit | Test | Explain | Document
fn check_number(num: Option<i32>) {
    match num {
        Some(n: i32) if n > 10 => println!("Größer als 10: {}", n),
        Some(n: i32) => println!("Kleiner als 10: {}", n),
        None => println!("Keine Zahl"),
    }
}
```

3. Rust anhand des RPN

Funktionalität

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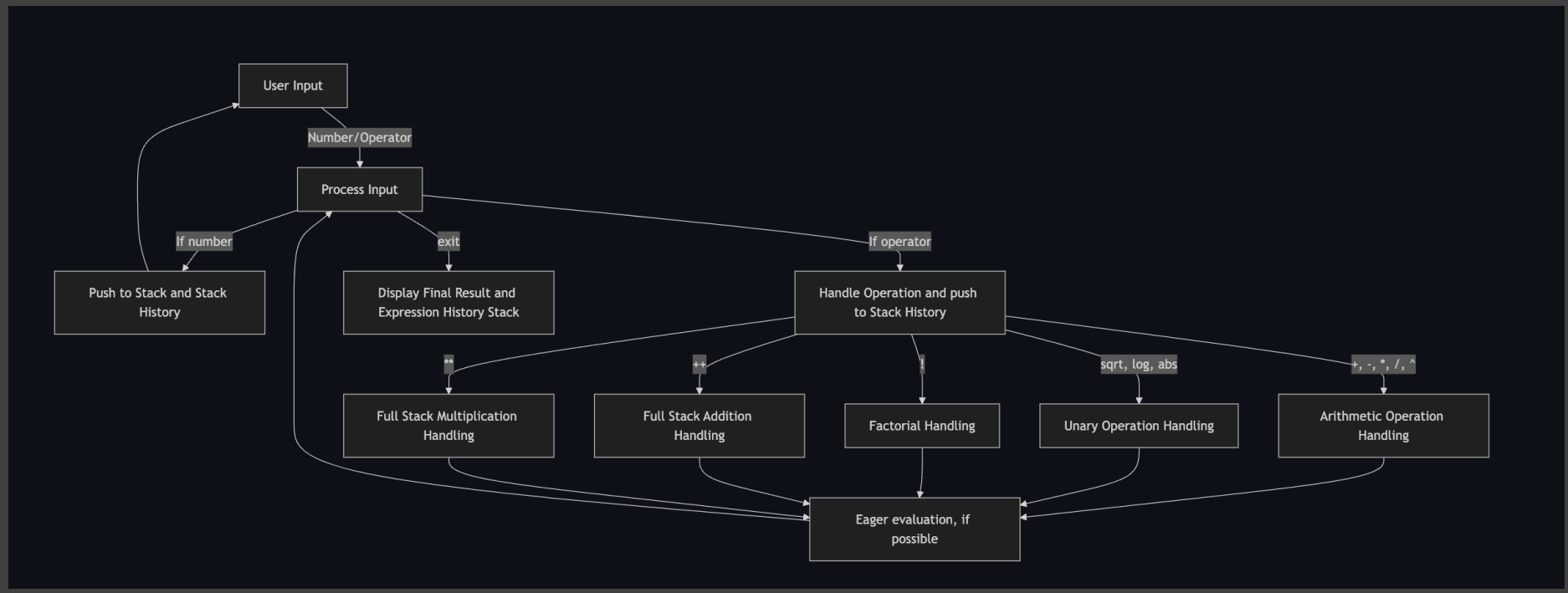

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```rust
// Library for handling user inputs
use std::io;

// Class declaration, clone trait
#[derive(Clone)]
2 implementations
struct RPNCalculator {
    stack: Vec<f64>,
    history_stack: Vec<String>,
}

impl RPNCalculator {
    // Constructor, initializing the vectors
    fn new() -> Self {
        Self {
            stack: Vec::new(),
            history_stack: Vec::new(),
        }
    }

```

Import IO dependency

Clone Trait

Struct

Attributes

Vector data structure

Implementation block for methods

Constructor

New Vector

Changing attributes of the „Self“ object

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```rust
// Main function for executing the RPN calculator
▶ Run | ⚙ Debug
fn main() {
    let mut calc: RPNCalculator = RPNCalculator::new();
    RPNCalculator::welcome_prompt();
    let mut input: String = String::new();

    // "Main loop", repeating logic for each input
    loop {
        input.clear();
        io::stdin().read_line(buf: &mut input).unwrap();
        let input: &str = input.trim();

        if input.eq_ignore_ascii_case("exit") {
            println!("Exiting RPN Calculator...");
            println!("Your infix calculation is: {}", calc.clone().reconstruct_expression_infix());
            println!("Your LaTeX calculation is: {}", calc.clone().reconstruct_expression_latex());

            match calc.get_result() {
                Some(value: f64) => println!("The final result is: {}", value),
                None => println!("No result available."),
            }
            break;
        }

        calc.apply_operation(token: input);

        match input {
            "+" | "-" | "*" | "/" | "^" | "sqrt" | "log" | "abs" | "++" | "**" | "!" => {
                if let Some(value: f64) = calc.get_result() {
                    println!("The current result is: {}", value);
                }
            }
            _ => {}
        }
    }
} fn main
```

Initialization variable
Method calls on classes

Loop

io
unwrap()

Std function calls

Default case

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```rust
// Applying operation to the stack
fn apply_operation(&mut self, token: &str) {
    self.history_stack.push(token.to_owned());
    match token {
        "+" | "-" | "*" | "/" | "^" => {
            self.arithmetical_operation_handling(token);
        }
        "sqrt" | "log" | "abs" => {
            self.log_abs_sqrt_operation_handling(token);
        }
        "!" => {
            self.factorial_operation_handling();
        }
        "++" => {
            self.full_stack_addition_handling();
        }
        "**" => {
            self.full_stack_multiplication_handling();
        }
        _ => {
            match token.parse::<f64>() {
                Ok(_) => self.new_number_handling(token),
                Err(_) => {
                    println!("Invalid input '{}'", token);
                    self.history_stack.pop();
                }
            }
        }
    }
} fn apply_operation
```

Method call on object
push()

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```
50
51      fn arithmetical_operation_handling(&mut self, token: &str) {
52          let b: f64 = self.stack.pop().unwrap();
53          let a: f64 = self.stack.pop().unwrap();
54          let result: f64 = match token {
55              "+" => a + b,
56              "-" => a - b,
57              "*" => a * b,
58              "/" => a / b,
59              "^" => a.powf(b),
60              _ => unreachable!(),
61          };
62          self.stack.push(result);
63      }
```

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```
120     fn reconstruct_expression_infix(&mut self) -> String {
121         if let Some(token: String) = self.history_stack.pop() {
122             match token.as_str() {
123                 "+" | "-" | "*" | "/" | "^" => {
124                     let right: String = self.reconstruct_expression_infix();
125                     let left: String = self.reconstruct_expression_infix();
126                     format!("({} {} {})", left, token, right)
127                 }
```

if let Some(T) = überprüft ob Rückgabewert nicht None ist