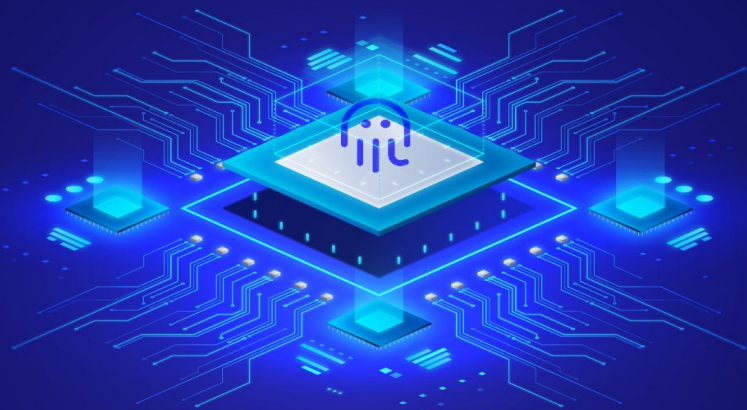


MIỄN PHÍ KHÓA ĐÀO TẠO

LẬP TRÌNH BLOCKCHAIN TÙY CHỈNH TRÊN SUBSTRATE OCT + MINIHACKATHON



Nội Dung Khóa Học:

Phần 1:

Làm quen với lập trình rust cơ bản (2-3 tuần)

Phần 2:

Làm quen cơ bản với substrate theo hướng dẫn (1 Tuần)

Phần 3:

Lập trình Blockchain nâng cao (thực chiến với giảng viên 6 tuần)

Phần 4:

Teamup tham gia Minihackathon (2 tuần)

Hạn chót đăng ký: 07/06/2022

Giải Thưởng: 4.000\$ /khóa



Struct, Enum, Vector, Generic Type



1. Struct

Struct: Tập hợp các kiểu dữ liệu khác nhau

```
fn main() {  
    let student_a = Student { name: "John".to_string(), age: 20, class: "B1".to_string()}  
}
```

```
struct Student {  
    name: String,  
    age: u8,  
    class: String,}
```

```
struct  
Student  
name, age, class  
student_a
```



1. Struct : Mô tả hành vi

```
impl Student {  
    fn get_name(self) -> String {  
        self.name  
    }  
    fn print_name(self) {  
        println!("Name: {}", self.get_name());  
    }  
}
```

Sử dụng từ khoá impl

1. Struct: Vấn đề 1 nếu không có từ khoá **self**

```
impl Student{  
    fn get_name()-> String{  
        name  
    }  
}
```

error[E0425]: cannot find value `name` in this scope
--> src/main.rs:19:9

```
19 |         name  
    |         ^^^^ a field by this name exists in `Self`
```

1. Struct: Vấn đề 2 từ khoá **Self**

```
impl Student{
  fn new()-> Student{
    Student{
      name:String::from("Mike"),
      age:24,
      class:String::from("B"),
    }
  }
}
```

```
impl Student{
  fn new()-> Self{
    Self{
      name:String::from("Mike"),
      age:24,
      class:String::from("B"),
    }
  }
}
```

1. Struct: dùng self, &self, &mut self

```
struct Object{  
    width: i32,  
    length: i32,  
}  
  
impl Object{  
    fn new(width: i32, length: i32) -> Object {  
        Object {width: width, length: length}  
    }  
    fn area(self) -> i32 {  
        self.width * self.length  
    }  
}
```

```
let p = Object {  
    width: 50,  
    length: 50,  
};  
  
println!("{}", p.width, p.length, p.area());
```

self: Ownership

1. Struct: dùng self, &self, &mut self

```
fn area(self) -> i32 {  
    self.width * self.length  
}
```

```
let p = Object {  
    width: 50,  
    length: 50,  
};  
  
println!("{}", p.width, p.length, p.area());  
println!("{}", p.width, p.length, p.area());
```

```
println!("{}", p.width, p.length, p.area());  
-----^-----  
|               |               |  
|               |               | move out of `p` occurs here  
|               | borrow of `p.width` occurs here  
| borrow later used here
```

Lỗi



1. Struct: dùng self, &self, &mut self

```
fn area(&self) -> i32 {  
    self.width * self.length  
}
```

```
let p = Object {  
    width: 50,  
    length: 50,  
};  
  
println!("{}", p.width, p.length, p.area());  
println!("{}", p.width, p.length, p.area());
```

&self: shared Reference



1. Struct: dùng self, &self, &mut self

```
fn increase(&mut self) {  
    self.width = self.width + 20;  
    self.length = self.length + 20;  
}
```

```
let mut p = Object {  
    width: 50,  
    length: 50,  
};  
println!("{}", p.width, p.length, p.area());  
p.increase();  
println!("{}", p.width, p.length, p.area());
```

&mut self: Mutable Reference



2. Enum

```
#[derive(Debug)]  
enum Position{  
    One,  
    Two,  
    Three  
}
```

```
#[derive(Debug)]  
enum Person {  
    Peter(Position),  
    Adam(Position)  
}
```

```
let one = Position::One;  
let two = Position::Two;  
let who = Person::Peter(Position::One);  
println!("{:?}", one);  
println!("{:?}", who);
```



2. Enum

```
#[derive(Debug)]  
enum Position{  
    One,  
    Two,  
    Three  
}
```

```
#[derive(Debug)]  
enum Person {  
    Peter(Position),  
    Adam(Position)  
}
```

```
let one = Position::One;  
let two = Position::Two;  
let who = Person::Peter(Position::One);  
println!("{:?}", one);  
println!("{:?}", who);
```



2. Enum

```
#[derive(Debug)]  
enum Info{  
    Peter(Student),  
    Adam(Student)  
}
```

```
let student_a = Student{  
    name:String::from("John"),  
    age:20,  
    class:String::from("A"),  
};  
let info = Info::Peter(student_a);  
println!("{:?}" , info);
```



2. Enum

```
enum Direction { North, East, South, West }
```

```
fn main() {  
    let direction:Direction = Direction::North;  
    match direction {  
        Direction::North => {  
            println!("Direction is north");  
        },  
        Direction::East => {  
            println!("Direction is East");  
        },  
        Direction::South => {  
            println!("Direction is South");  
        },  
        Direction::West => {  
            println!("Direction is West");  
        }  
    }  
}
```



3. Vec

`let mut a = Vec::new();` //1. Sử dụng `new()` method

`let mut b = vec![];` //2. Sử dụng `vec!` macro



3. Vec

//Lấy giá trị và thay đổi giá trị

```
let mut c = vec![5, 4, 3, 2, 1];
```

```
c[0] = 1;
```

```
c[1] = 2;
```




3. Vec

//push and pop

```
let mut d: Vec<i32> = Vec::new();
```

d.push(1); //[1] : Thêm giá trị vào vị trí cuối cùng của vec

d.push(2); //[1, 2]

d.pop(); //[1] : : Xoá giá trị vào vị trí cuối cùng của Vec



3. Vec

```
let mut v = vec![1, 2, 3, 4, 5];
```

```
for i in &v {
```

```
    println!("A reference to {}", i);
```

```
}
```

```
for i in &mut v {
```

```
    println!("A mutable reference to {}", i);
```

```
}
```

```
for i in v {
```

```
    println!("Take ownership of the vector and its  
element {}", i);
```

```
}
```



3. Vec

Phân biệt `iter()`, `into_iter()`, `iter_mut()`,

The iterator returned by `into_iter` may yield any of `T`, `&T` or `&mut T`, depending on the context.

The iterator returned by `iter` will yield `&T`, by convention.

The iterator returned by `iter_mut` will yield `&mut T`, by convention.



4. Generic type


Generic type là kiểu dữ liệu chung (placeholder) có thể thay thế cho các kiểu dữ liệu Rust

```
fn main() {  
    let x = get_u8(10u8);  
    let y = get_u8(10u16);  
}  
  
fn get_u8(input: u8) -> u8 {  
    input  
}
```

Lỗi

4. Generic type

```
fn main() {  
    let x = get_u8(10u8);  
    let y = get_u8(10u16);  
}  
  
fn get_u8<T>(input: T) -> T{  
    input  
}
```



```
fn get_u8(input: u8) -> u8{  
    input  
}
```

```
fn get_u8(input: u16) -> u16{  
    input  
}
```

4. Generic type in Struct

```
impl<T> Point<T> {  
    fn get_x(&self) -> &T {  
        &self.x  
    }  
}
```

```
let integer = Point { x: 5, y: 10 };  
let float = Point { x: 1.0, y: 4.0 };  
println!("integer.x = {}", integer.get_x());  
println!("float.x = {}", float.get_x());
```



4. Generic type in Struct

```
struct Point<T> {  
    x: T,  
    y: T,  
}
```

```
fn main() {  
  
    let integer = Point { x: 5, y: 10 };  
    let float = Point { x: 1.0, y: 4.0 };  
  
}
```



4. Generic type in Struct

```
struct Point<T, U> {  
    x: T,  
    y: U,  
}
```

```
let integer = Point { x: 5, y: 10.5 };  
let float = Point { x: 1.5, y: 4.0 };  
println!("integer.x = {}", integer.get_x());  
println!("float.x = {}", float.get_x());
```

```
impl<T,U> Point<T,U> {  
    fn get_x(&self) -> &T {  
        &self.x  
    }  
}
```




4. Generic type in Enum

```
pub enum Option<T> {  
    None,  
    Some(T),  
}
```



4. Generic type in Enum

Option

Làm sao lấy giá trị trong Option?

```
fn main() {  
  let x: Option<i32> = Some(5);  
  let y: Option<f64> = Some(5.0f64);  
}
```



5. Thực hành

Bài 1: Điền vào dấu chấm hỏi

```
fn main() {  
    let mut shopping_list: Vec<?> = Vec::new();  
    shopping_list.push("milk");  
}
```



5. Thực hành

Bài 2: Trường dữ liệu value của Wrapper có thể sử dụng u32 hoặc String hoặc ...

```
struct Wrapper {  
    value: u32,  
}  
  
impl Wrapper {  
    pub fn new(value: u32) -> Self {  
        Wrapper { value }  
    }  
}
```



5. Thực hành

Bài 3: Bước 1: Thực hiện một implement in ra tất cả các trường dữ liệu. Bước 2: đối với trường dữ liệu **grade**, ta có thể có trường hợp là “A+”, “B+” ,...

```
pub struct ReportCard {  
    pub grade: f64,  
    pub student_name: String,  
    pub student_age: u8,  
}
```



5. Thực hành

Bài 4: TODO

```
enum Message {  
  
    // TODO: define a few types of messages as used  
    below  
  
}  
  
fn main() {  
  
    println!("{:?}", Message::Quit);  
  
    println!("{:?}", Message::Echo);  
  
    println!("{:?}", Message::Move);  
  
    println!("{:?}", Message::ChangeColor);  
  
}
```



5. Thực hành

```
#[derive(Debug)]
enum Message {
    // TODO: define the different variants
    // used below
}

impl Message {
    fn call(&self) {
        println!("{:?}", &self);
    }
}
```

```
fn main() {
    let messages = [
        Message::Move { x: 10, y: 30 },
        Message::Echo(String::from("hello world")),
        Message::ChangeColor(200, 255, 255),
        Message::Quit,
    ];

    for message in &messages {
        message.call();
    }
}
```



5. Thực hành

```
fn print_number(maybe_number: Option<u16>) {  
    println!("printing: {}", maybe_number.unwrap());  
}  
  
fn main() {  
    print_number(13);  
    print_number(99);  
  
    let mut numbers: [Option<u16>; 5];  
    for iter in 0..5 {  
        let number_to_add: u16 = {  
            ((iter * 1235) + 2) / (4 * 16)  
        };  
  
        numbers[iter as usize] = number_to_add;  
    }  
}
```




5. Thực hành

```
#[derive(Debug, Clone)]
struct MyData {
    val1: i32,
    val2: String,
}

fn main() {
    let d = MyData {
        val1: 35,
        val2: String::from("Hello World"),
    };

    let both = d.get_both();
    let x = d.get_val1();
    let y = d.get_val2();
}
```

```
impl MyData {
    pub fn get_val1(self) -> i32 {
        return self.val1.clone();
    }

    pub fn get_val2(self) -> String {
        return self.val2.clone();
    }

    pub fn get_both(self) -> (i32, String) {
        return (self.val1, self.val2);
    }
}
```



5. Thực hành

```
fn main() {  
    let a = A {p: Some("p".to_string())};  
    a.a();  
}
```

```
struct A {  
    p: Option<String>  
}
```

```
impl A {  
    fn a(self) -> Self {  
        Self::b(&self.p.unwrap());  
        self  
    }  
    fn b(b: &str) {  
        print!("{}", b)  
    }  
}
```



5. Thực hành

```
// Fill in the blanks to make it work
struct A;          // Concrete type `A`.
struct S(A);       // Concrete type `S`.
struct SGen<T>(T); // Generic type `SGen`.

fn reg_fn(_s: S) {}

fn gen_spec_t(_s: SGen<A>) {}

fn gen_spec_i32(_s: SGen<i32>) {}

fn generic<T>(_s: SGen<T>) {}

fn main() {
    // Using the non-generic functions
    reg_fn(__); // Concrete type.
    gen_spec_t(__); // Implicitly specified type parameter `A`.
    gen_spec_i32(__); // Implicitly specified type parameter `i32`.

    // Explicitly specified type parameter `char` to `generic()`
```



5. Thực hành

// Implement the generic function below.

```
fn sum
```

```
fn main() {
```

```
    assert_eq!(5, sum(2i8, 3i8));
```

```
    assert_eq!(50, sum(20, 30));
```

```
    assert_eq!(2.46, sum(1.23, 1.23));
```

```
    println!("Success!");
```

```
}
```



5. Thực hành

// Implement struct Point to make it work.

```
fn main() {  
    let integer = Point { x: 5, y: 10 };  
    let float = Point { x: 1.0, y: 4.0 };  
  
    println!("Success!");  
}
```



5. Thực hành

```
// Modify this struct to make the code work
struct Point<T> {
    x: T,
    y: T,
}

fn main() {
    // DON'T modify this code.
    let p = Point{x: 5, y : "hello".to_string()};

    println!("Success!");
}
```



5. Thực hành

```
// Add generic for Val to make the code work, DON'T modify the code  
in `main`.
```

```
struct Val {  
    val: f64,  
}
```

```
impl Val {  
    fn value(&self) -> &f64 {  
        &self.val  
    }  
}
```

```
fn main() {
```



5. Thực hành

// Fix the errors to make the code work.

```
struct Point<T> {  
    x: T,  
    y: T,  
}  
  
impl Point<f32> {  
    fn distance_from_origin(&self) -> f32 {  
        (self.x.powi(2) + self.y.powi(2)).sqrt()  
    }  
}
```