Rust'a Giriş

Hafta -1

Kurulum

https://www.rust-lang.org/tools/install

cargo

Ne için kullanılır?

- Yeni proje oluşturmak
- Projeyi derlemek
- Projeye bağımlılık (paket) eklemek
- Projeyi çalıştırmak
- Projeyi test etmek
-
- Kısaca: Her şey için "cargo"

cargo

Yeni proje

```
$ cargo init
```

cargo

Derleme

```
$ cargo build
```

cargo

Bağımlılık ekleme

Cargo.toml:

```
[dependencies]
paket = "versiyon"

rustfft = "6.0.1"
```

cargo

Çalıştırma

```
$ cargo run
```

cargo

Testleri çalıştırma

```
$ cargo test
```

cargo

Proje hiyerarşisi

```
/Cargo.toml        - Proje bilgileri

/src               - Kaynak kodlar
  --/main.rs
  --/lib.rs        - *eğer bir crate ise

/target            - Exe çıktısı ve bağımlılıklar
```

Syntax

Değişkenler

```
let a = 1;

let b = 1i32;

let c:i32 = 1;
```

Syntax

Değişkenler

Length	Signed	Unsigned
8-bit	i8	u8
16-bit	i16	u16
32-bit	i32	u32
64-bit	i64	u64
128-bit	i128	u128
İşlemci Bit Genişliği	isize	usize

Syntax

Değişkenler

```
let i = 1;

i = 5;
```

```
error[E0384]: cannot assign twice to immutable variable `i`
  --> main.rs:14:5
   |
13 |     let i = 1;
   |         -
   |         |
   |         first assignment to `i`
   |         help: consider making this binding mutable: `mut i`
14 |     i = 5;
   |     ^^^^^ cannot assign twice to immutable variable
```

Syntax

Mutability (Değiştirilebilirlik)

```
let mut i = 1;

i = 5; // Ok!
```

Syntax

Fonksiyonlar

```
fn main() {

}
```

Syntax

Fonksiyonlar

```
fn karesi( sayi:i32 ) -> i32 {
     return sayi * sayi;
}

fn main() {
     karesi(2); // 4
}
```

Syntax

Fonksiyonlar

```
fn karesi( sayi:i32 ) -> i32 {
     sayi * sayi
}

fn main() {
     karesi(2); // 4
}
```

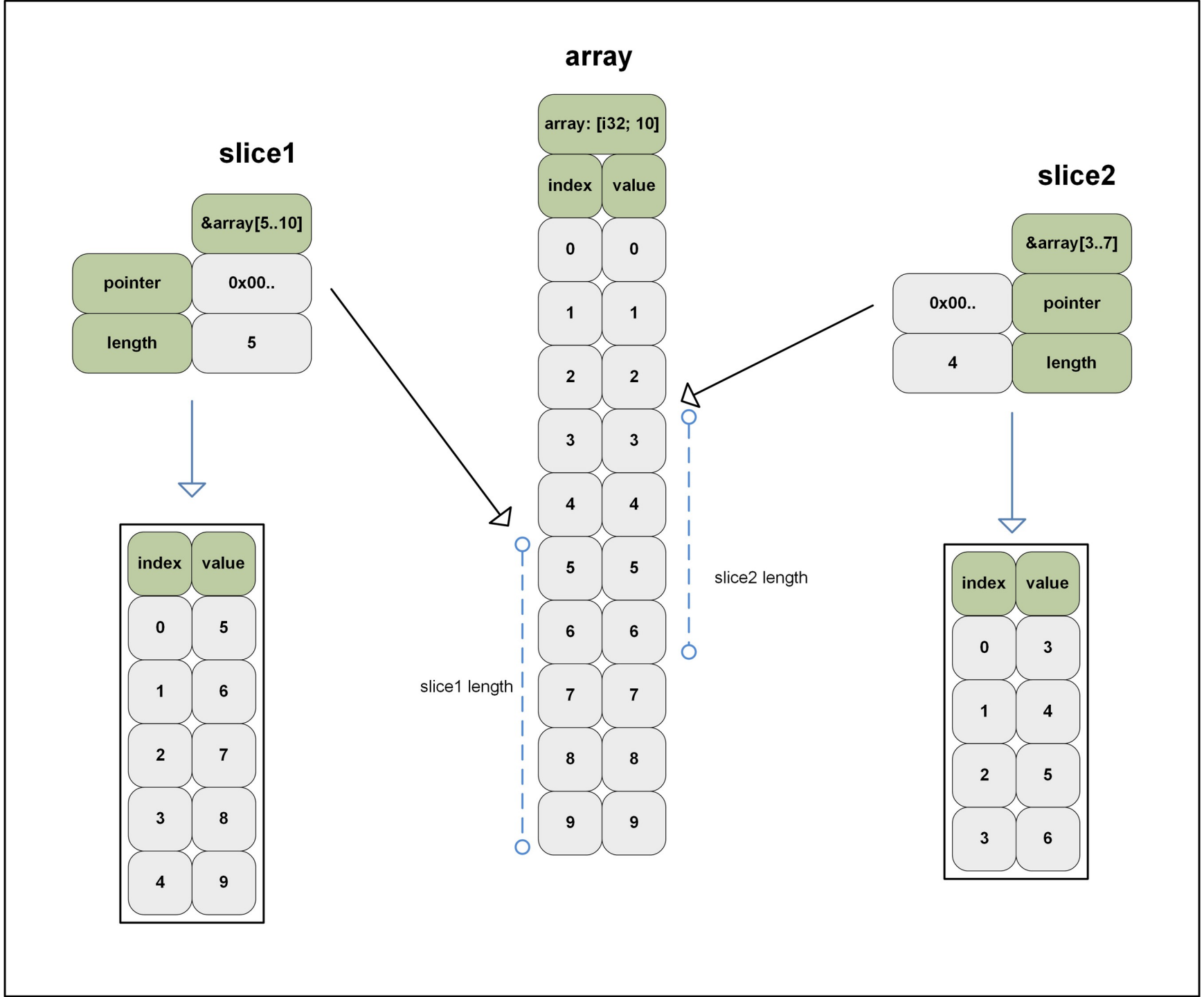
Syntax

Slice (dilim)

```
fn main() {
     // 6 elemanlı i32 tipli bir dizi
     let array: [i32; 6] = [10, 20, 30, 40, 50, 60];
     println!("array: {array:?}");

     // i32 tipli bir dizinin seçilmiş bir aralıktaki dilimi
     let slice: &[i32] = &array[2..4];
     println!("slice: {slice:?}");
}
```

```
> array: [10, 20, 30, 40, 50, 60]
slice: [30, 40]
```


array
array: [i32; 10]
index
value
0
0
1
1
2
2
3
3
4
4
5
5
6
6
7
7
8
8
9
9
slice1
&array[5..10]
pointer
0x00..
length
5
index
value
0
5
1
6
2
7
3
8
4
9
slice1 length
slice2 length
slice2
&array[3..7]
0x00..
pointer
4
length
index
value
0
3
1
4
2
5
3
6

Syntax

String ve str

```
fn selam( isim:&str ) -> String {
     format!("Selam {}", isim)
}

fn main() {
     let isim = "Emin";

     selam(isim); // "Selam Emin"
}
```

`&str` : Immutable(değiştirilemez) bir string slice referansı.

`String`: Heap'te oluşturulan mutable(değiştirilebilir) bir String struct'ı

Syntax

String ve str

```
fn selam( isim:&str ) -> String {
     format!("Selam {}", isim)
}

fn main() {
     let isim = "Emin";

     println!("{}", selam(isim));
}
```

```
> Selam Emin
```

Syntax

Vec ve array

```
fn main() {
     let array:[i32; 3] = [1, 2, 3];
}
```

Syntax

Vec ve array

```
fn main() {
     let array = [1, 2, 3];

     array[3] = 4;  // index out of bounds
     array[0] = 10; // cannot assign immutable variable
}
```

Syntax

Vec ve array

```
fn main() {
     let mut array = [1, 2, 3];

     array[3] = 4;  // index out of bounds
     array[0] = 10;
}
```

Syntax

Vec ve array

```
fn main() {
     let mut vector = Vec::from([1, 2, 3]);
}
```

Syntax

Vec ve array

```
fn main() {
     let mut vector = vec![1, 2, 3];
}
```

Syntax

Vec ve array

```
fn main() {
     let mut vector = vec![0; 3];

     vector.push(4); // vector = [0, 0, 0, 4]
     vector.pop();   // vector = [0, 0, 0]
}
```

Syntax

HashMap (Dictionary)

```
fn main() {
     let mut hm:HashMap<i32, &str> = HashMap::new();

     hm.insert(42, "masa");
     hm.insert(16, "sandalye");

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

```
> {42: "masa", 12: "sandalye"}
```

Syntax

HashMap (Dictionary)

```
fn main() {
     let mut hm = HashMap::new();

     hm.insert(42, "masa");     // derleyici, HashMap'in tipini algılar
     hm.insert(16, "sandalye");

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

```
> {42: "masa", 12: "sandalye"}
```

Ownership

```
fn use_hashmap(hm:HashMap<i32, &str>) {

}

fn main() {
     let mut hm = HashMap::new();

     hm.insert(42, "masa");
     hm.insert(16, "sandalye");

     use_hashmap(hm);

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

```
11 |     use_hashmap(hm);
   |                  -- value moved here
12 |
13 |     println!("{:?}", hm);
   |                       ^^ value borrowed here after move
```

Ownership

```
fn use_hashmap(hm:HashMap<i32, &str>) -> HashMap<i32, &str> {
     hm
}

fn main() {
     let mut hm = HashMap::new();

     hm.insert(42, "masa");
     hm.insert(16, "sandalye");

     let mut hm = use_hashmap(hm);

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

```
> {42: "masa", 12: "sandalye"}
```

Borrowing

```
fn use_hashmap(hm:&HashMap<i32, &str>) {

}

fn main() {
     let mut hm = HashMap::new();

     hm.insert(42, "masa");
     hm.insert(16, "sandalye");

     use_hashmap(&hm); // Sahipliğini almadı, reference

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

```
> {42: "masa", 12: "sandalye"}
```

Syntax

Control Flow: if, if let

```
fn main() {
     let a = 1;
     if a == 1 {
          println!("a == 1");
     } else {
          println!("a != 1");
     }
}
```

```
> a == 1
```

Syntax

Control Flow: if, if let

```
fn main() {
     let a:Option<i32> = Some(1);

     if let Some(deger) = a {
          println!("Bir değer varmış: {}", deger);
     } else {
          println!("a nullmuş.");
     }
}
```

```
> Bir değer varmış: 1
```

Syntax

Control Flow: if, if let

```
fn main() {
     let a:Option<i32> = None;

     if let Some(deger) = a {
          println!("Bir değer varmış: {}", deger);
     } else {
          println!("a nullmuş.");
     }
}
```

```
> a nullmuş.
```

Syntax

match

```
fn main() {
     let a = 1;
     match a {
          1 => println!("a == 1"),
          _ => println!("a != 1"),
     }
}
```

```
> a == 1
```

Syntax

match

```
fn main() {
     let a = 5;
     match a {
          0..=4  => println!("0 ≤ a ≤ 4"),
          5..=10 => println!("5 ≤ a ≤ 10"),
          _ => (),
     }
}
```

```
> 5 ≤ a ≤ 10
```

Syntax

Loops: for

```
fn main() {
     for i in 1..=41 {
          println!("maşaallah");
     }
}
```

```
> maşaallah
> maşaallah
> maşaallah
> ...
```

Syntax

Loops: while

```
fn main() {
     let mut i = 1;

     while i <= 41 {
          println!("maşaallah");

          i += 1;
     }
}
```

```
> maşaallah
> maşaallah
> maşaallah
> ...
```

Syntax

Loops: loop

```
fn main() {
     let mut i = 1;

     loop {
          println!("maşaallah");

          i += 1;
          if i > 41 {
               break;
          }
     }
}
```

```
> maşaallah
> maşaallah
> maşaallah
> ...
```

Syntax

Loops: while let

```
fn main() {
     let mut x = vec![1, 2, 3];

     while let Some(deger) = x.pop() {
          println!("deger = {}", deger);
     }
}
```

```
> deger = 3
> deger = 2
> deger = 1
```

Homeworks

1. Write `fn hello(name:&str) -> String` will return: "Hello {name}!"
2. Write `fn make_double(num:i32) -> i32` will return: 4 when given 2
3. Write `fn multiply_pi(num:f32) -> f32` will multiply the num with Pi(π) and return the result.