Rust<T>

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Coredump Rapperswil

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Admin

Admin

- Slides are online: `https://github.com/coredump-ch/rust-t`
- Examples are included in the `examples` directory.
- Slides of Danilo & Raphael:
  `https://github.com/coredump-ch/intro-to-rust`

Recap from last time

Example 2: Generics

```
fn min<T: Ord>(a: T, b: T) -> T {
    if a <= b { a } else { b }
}
```

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```
fn min<T: Ord>(a: T, b: T) -> T {
    if a <= b { a } else { b }
}

...

min(10i8,  20)    == 10;    // T is i8
min(10,    20u32) == 10;    // T is u32
min("abc", "xyz") == "abc"; // &str or Strings are Ord
min("abc".to_string(), "ABC".into()) == "ABC";

min(10i32, "xyz"); // error: mismatched types
```

Simple Generics

Enum

```
enum Colors {
  Red,
  Green,
  Blue,
}
use Colors::*;

fn draw(color: Colors) {
  match color {
    ...
  }
}
```

Enum

```
use Colors::*;

fn main() {
  draw(Red);
  draw(Blue);
}

fn draw(color: Colors) {
  match color {
    Red   => 0xff0000,
    Green => 0x00ff00,
    Blue  => 0x0000ff,
  }; // no return
}
```

Enum: non-exhaustive patterns

```
fn draw(color: Colors) {
  match color {
    Red => 0xff0000,
    // Green => 0x00ff00,
    Blue => 0x0000ff,
  };
}
```

Enum: non-exhaustive patterns

```
$ cargo run
src/main.rs:15:3: 19:4 error: non-exhaustive patterns:
↪  `Green` not covered [E0004]
src/main.rs:15   match color {
src/main.rs:16     Red => 0xff0000,
src/main.rs:17     // Green => 0x00ff00,
src/main.rs:18     Blue => 0x0000ff,
src/main.rs:19   }; // no return
src/main.rs:15:3: 19:4 help: run `rustc --explain E0004` to
↪  see a detailed explanation
error: aborting due to previous error
error: Could not compile `enum`.

To learn more, run the command again with --verbose.
```

Into() complex Type

Into() complex Type: Infrastructure

```rust
#[derive(Debug, Clone)]
struct MyObject {
  is : Option<isize>,
  st : Option<String>,
}

impl Into<MyObject> for isize {
  fn into(self) -> MyObject {
    MyObject {
      is : Some(self),
      st : None,
    }
  }
}
```

Into() complex Type: Infrastructure

and the implementation for `String`:

```
impl Into<MyObject> for String {
  fn into(self) -> MyObject {
    MyObject {
      is : None,
      st : Some(self),
    }
  }
}
```

Into complex Type: Usage

```
let m0 = MyObject { is : Some(42), st : Some("Self
↪ Made".into()) };
```

Into complex Type: Usage

```
let m0 = MyObject { is : Some(42), st : Some("Self
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```

use with `isize`:

```
let m1 : MyObject = 23.into();
```

Into complex Type: Usage

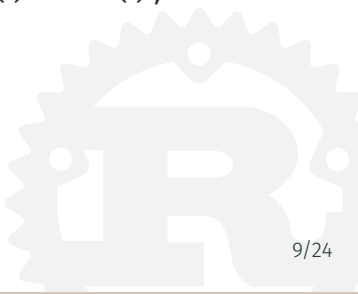
```
let m0 = MyObject { is : Some(42), st : Some("Self
↪ Made".into()) };
```

use with `isize`:

```
let m1 : MyObject = 23.into();
```

with `to_owned()` for `String`:

```
let m2 : MyObject = "Coredump.ch".to_owned().into();
```



Enum impl

Enum impl: Infrastructure

```
impl Person {
  // A function which takes a `Person` enum as an argument
  // and returns nothing.
  fn inspect(self) {
    // Usage of an `enum` must cover all cases (irrefutable)
    // so a `match` is used to branch over it.
    match self {
      Person::Engineer => { ... },
      ...
    }
  }
}
```

Enum impl: Usage

if we have an `Enum`:

```
let rohan    = Person::Engineer;
```

we can then use the method on the insance:

```
rohan.inspect();
```

Transport Data with Enums

Enum Transport: Infrastructure

```rust
#[derive(Debug)]
enum CompoundIndex {
  SearchIsize(isize),
  SearchString(String),
}
use CompoundIndex::*;
```

Enum Transport: Usage

a number:

```
let number = SearchIsize(42);
```

Enum Transport: Usage

a number:

```
let number = SearchIsize(42);
```

a `String`:

```
let string = SearchString("Coredump.ch".into());
```

Enum Transport: Usage

a number:

```
let number = SearchIsize(42);
```

a `String`:

```
let string = SearchString("Coredump.ch".into());
```

an empty `String`:

```
let string = SearchString("".into());
```

Search a Vector<T>

Search a Vector<T>: Infrastructure

```
fn find(haystack : &Vec<MyObject>, needle : &CompoundIndex)
↪  -> Option<MyObject> {
  for ref hay in haystack {
    match needle {
      &SearchIsize(ref needle) => {
        if let Some(ref is) = hay.is {
          if is == needle {
            return Some( (*hay).clone() );
          }
        }
      },
      ...
    } // end match
  }
  None
}
```

Search a Vector<T>: Infrastructure

```
fn find(haystack : &Vec<MyObject>, needle : &CompoundIndex)
↪  -> Option<MyObject> {
  for ref hay in haystack {
    match needle {
      ...
      &SearchString(ref needle) => {
        if let Some(ref st) = hay.st {
          if st == needle {
            return Some( (*hay).clone() );
          }
        }
      },
    } // end match
  }
  None
}
```

Search a Vector<T>: Usage

Prepare the `Vector<MyObject>`:

```
let m0 = MyObject { is : Some(42), st : Some("Self
↪ Made".into()) };
let m1 : MyObject = 23.into();
let m2 : MyObject = "Coredump.ch".to_owned().into();

let v = vec![m0, m1, m2];
```

Search a Vector<T>: Usage

and search it:

```
let number = SearchIsize(42);
println!("\n Find with number: {:?} => {:?}", number,
↪  find(&v, &number));

let string = SearchString("".into());
println!("\n Find with String: {:?} => {:?}", string,
↪  find(&v, &string));
let string = SearchString("Coredump.ch".into());
println!("\n Find with String: {:?} => {:?}", string,
↪  find(&v, &string));
```

Search a Vector<T>: Output

```
Find with number: SearchIsize(42) => Some(MyObject { is:
↪  Some(42), st: Some("Self Made") })

Find with String: SearchString("") => None

Find with String: SearchString("Coredump.ch") =>
↪  Some(MyObject { is: None, st: Some("Coredump.ch") })
```

Sending Commands over Channels

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Infrastructure:

```
use std::sync::mpsc::channel;

let (tx, rx) = channel();
```

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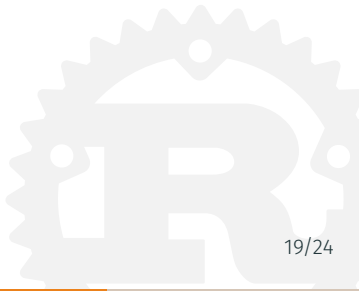
```
use std::sync::mpsc::channel;

let (tx, rx) = channel();
```

Usage:

```
tx.send(42).unwrap();
assert_eq!(42, rx.recv().unwrap());
```



Sending Commands over Channels

Infrastructure:

```
use std::sync::mpsc::channel;

let (tx, rx) = channel();
```

Usage:

```
tx.send(42).unwrap();
assert_eq!(42, rx.recv().unwrap());
```

Works with complex Types:

```
let (tx, rx) = channel::<MyCommands<u64>>();
```

Massive errors

Natural occurences:

```
let n = 10;
let y = (["a", "b"])[n]; // panics

my_io_function().unwrap() // maybe panics
```

Massive errors

Natural occurences:

```
let n = 10;
let y = (["a", "b"])[n]; // panics

my_io_function().unwrap() // maybe panics
```

Synthesized:

```
panic!("with a message")
```

Handling panic: 1/3

```
let pool = ThreadPool::new(4);

  let (tx, rx) = channel();
  for i in 0..8 {
    let tx = tx.clone();
    pool.execute(move|| {
      // -- panicking work here --
    });
  }

  assert_eq!(24, rx.iter().take(8).fold(0, |a, b| a + b));
```

Handling panic: 1/3

```
let rx = {
  let (tx, rx) = channel();
  for i in 0..8 {
    let tx = tx.clone();
    pool.execute(move|| {
      // -- panicking work here --
    });
  }
  rx
};

assert_eq!(24, rx.iter().take(8).fold(0, |a, b| a + b));
```

Handling panic: 3/3

```
let rx = {
  let (tx, rx) = channel();
  for i in 0..8 {  let tx = tx.clone();
    pool.execute(move|| {
      if i == 4 { // -- unexpected failure added here --
        panic!("unexpected panic");
      }
      tx.send(i).unwrap();
    });
  }
  rx
};
// And now this code waits for all the senders to be
↪  destructed or the first 8 values:
assert_eq!(24, rx.iter().take(8).fold(0, |a, b| a + b));
```

Day-Time-Tools

Day-Time-Tools

Ease your day

- git

Day-Time-Tools

Ease your day

- git
- cargo 

Ease your day

- git
- cargo 

- cargo outdated

```
└──╼ cargo outdated
Checking for SemVer compatible updates...Done
Checking for the latest updates...Done
The following dependencies have newer versions available:

    Name                    Project Ver  SemVer Compat  Latest Ver
    nickel                    0.7.3          --           0.8.1
    nickel->hyper             0.6.16         --           0.9.10
    nickel->lazy_static       0.1.15       0.1.16         0.2.1
    nickel->log               0.3.5        0.3.6          0.3.6
    nickel->mustache          0.6.3          --           0.7.0
    nickel->regex             0.1.48       0.1.74         0.1.74
    nickel->rustc-serialize   0.3.16       0.3.19         0.3.19
    nickel->time              0.1.34       0.1.35         0.1.35
    nickel->url               0.2.38         --           1.2.0
    rustc-serialize           0.3.16       0.3.19         0.3.19
```

Demotime

Questions?

Thank you!

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