MTAT.03.295
Agile Software Development

Lecture 3: Elixir standard libraries and control flow

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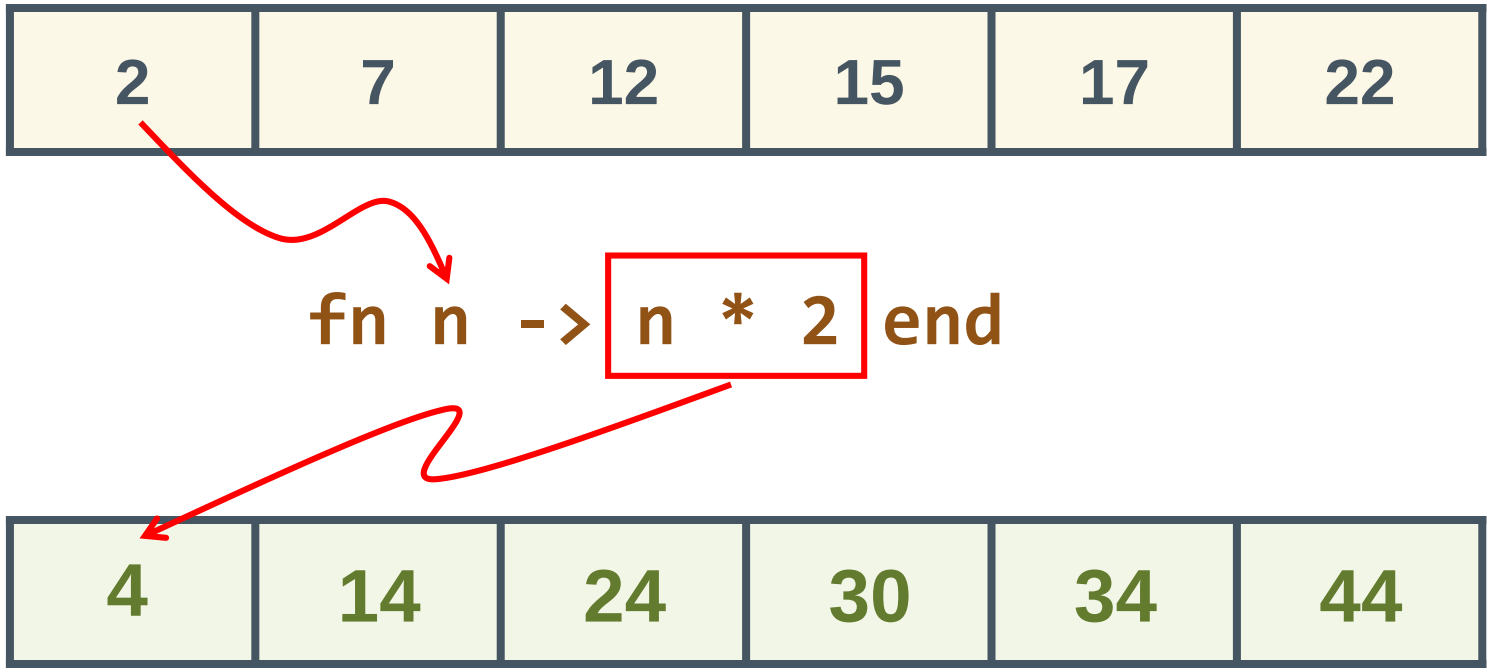
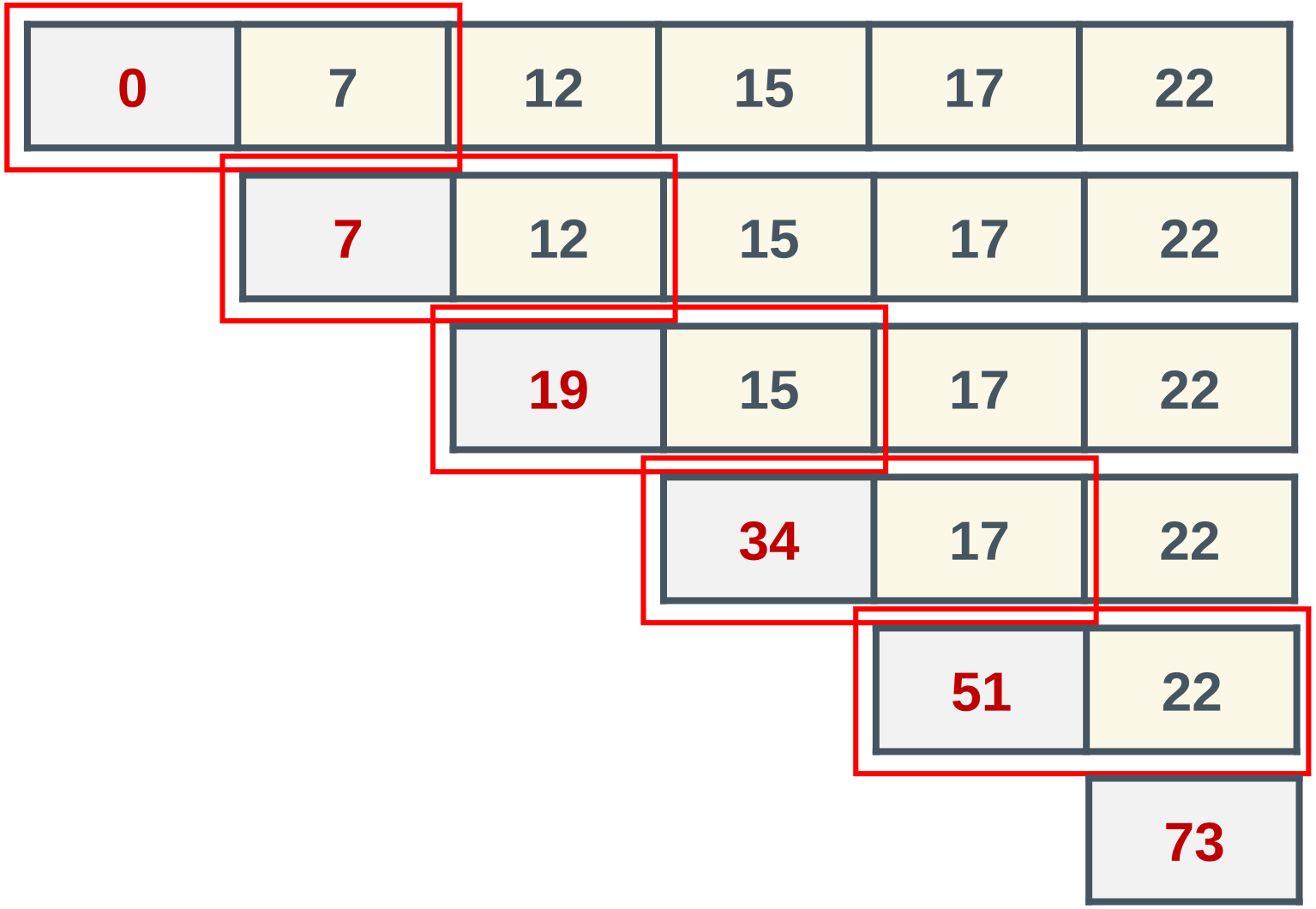
Map



Filter

Foldl/Reduce

```
fn n, acc -> n + acc end
```



Structured types

› Tuples

{:ok, 123, false}

› Lists

[1, 2, 3, 4]

```
[1, 2]++[3]      # Concatenation
[1, 2, 3]--[2]   # Difference
hd [1, 2, 3]     # List head
tl [1, 2, 3]     # ... Tail
[1 | [2, 3]]     # “Cons” operator
```

› Maps

%{:name => "Alfonso Cuarón", :age => 55}

Structured types

› Tuples

{:ok, 123, false}

› Lists

[1, 2, 3, 4]

```
t = {:ok, 123, false}
elem(t,0)                 # :ok
put_elem(t,0,:nok)        # {:nok, 123, false}
elem(t,3)                 # FAILS!!!!
```

› Maps

%{:name => "Alfonso Cuarón", :age => 55}

Structured types

› Tuples

{:ok, 123, false}

› Lists

[1, 2, 3, 4]

```
m = %{name: "Alfonso", age: 55}
%{age: age} = m                 # age ?
%{m | age: m.age + 1}           # m ?
```

› Maps

%{:name => "Alfonso Cuarón", :age => 55}

Binary trees

```
defmodule BinaryTree do
  def insert(nil, value), do: {value, nil, nil}

  def insert({value, left, right}, new_value)
      when new_value < value do
    {value, insert(left, new_value), right}
  end

  def insert({value, left, right}, new_value) do
    {value, left, insert(right, new_value)}
  end
  ...
end
```

In class exercise

- Write a function that implements an “in-order” traversal on a given binary tree
- Generalize the code above to a sort of “fold” function that takes as input an “accumulator” and an anonymous function and produces an ordered list (i.e. similar to the one produced by the in-order traversal)

Keyword lists

› Collection of key-value pairs (key is always an atom)

```
[fg: "blue", bg: "white", font: "Helvetica"]
```

```
[{:fg, "blue"}, {:bg, "white"}, {:font, "Helvetica"}]
```

› Extensively used!

```
if shoe_size <= 35, do: "child", else: "young adult"

if(shoe_size <= 35, [do: "child", else: "young adult"])
```

```
query = from c in Customer,
        where: c.type == "Loyal customer",
        select: c
```

Structs

› Derived from Maps, they come with some constraints that are checked at compilation time

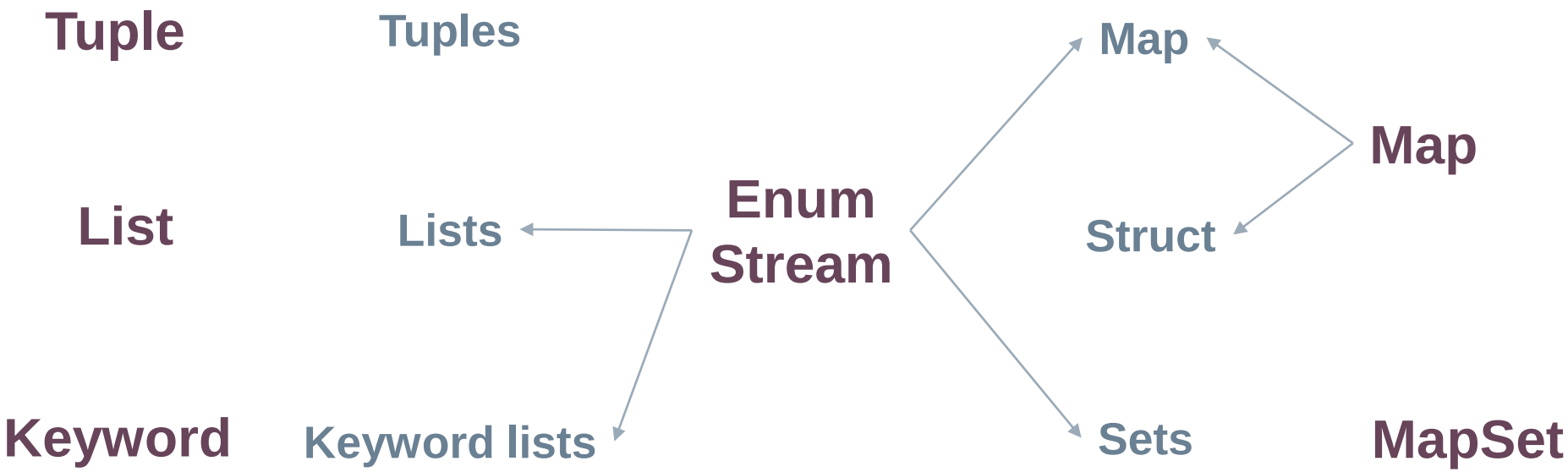
```
defmodule User do
  defstruct first_name: nil, last_name: nil, active: false
end
```

```
iex> user = %User{first_name: "Philip", last_name: "Brown"}
%User{active: false, first_name: "Philip", last_name: "Brown"}

iex> user = %User{first_name: "Philip", last_name: "Brown", location: "UK"}
** (KeyError) key :location not found in: %User{active: false, first_name:
"Philip", last_name: "Brown"}

iex> user[:first_name]  # This is wrong
```

Standard libraries for structured types



Standard libraries for simple types

› Worth having a look at the following libraries:
  – Regex
  – String
  – Time
  – Range
  – Integer

Sigils

~r	Regular expression with escaping and interpolation
~R	Regular expression, no escaping nor interpolation
~w	Word list with escaping and interpolation
~W	Word list, no escaping nor interpolation
~c	Charlist with escaping and interpolation
~C	Charlist, no escaping nor interpolation
~s	String with escaping and interpolation
~S	String with no escaping nor interpolation
~N	Naïve date time struct

if/else vs. cond

```elixir
def children_shoe(size) when size in 20..42 do
  if size <= 23 do
    "toddler"
  else
    if size <= 35 do
      "child"
    else
      "young adult"
    end
  end
end
```

```elixir
def children_shoe(size) when size in 20..42 do
  cond do
    size <= 23 -> "toddler"
    size <= 35 -> "child"
    true -> "young adult"
  end
end
```

case

- Similar to switch/case found in other languages
- In Elixir, however, we can use pattern matching in this construction

```
case Repo.insert(%Post{title: "Ecto is great"}) do
  {:ok, struct} -> # Inserted with success
  {:error, changeset} -> # Something went wrong
end
```

Errors is usually handled in this way and not by raising exceptions!

Comprehensions

› Not as conventional **for** loops … but rather a combination of map+filter

```
for x <- [1, 2, 3, 4, 5], do: x*x

for x <- [1, 2, 3, 4, 5], y <- ["a", "b"], do: {x,y}

for {_key, val} <- [one: 1, two: 2, three: 3], do: val

for x <- 1..10, is_even(x), do: x
```