Building Xamarin apps with F#

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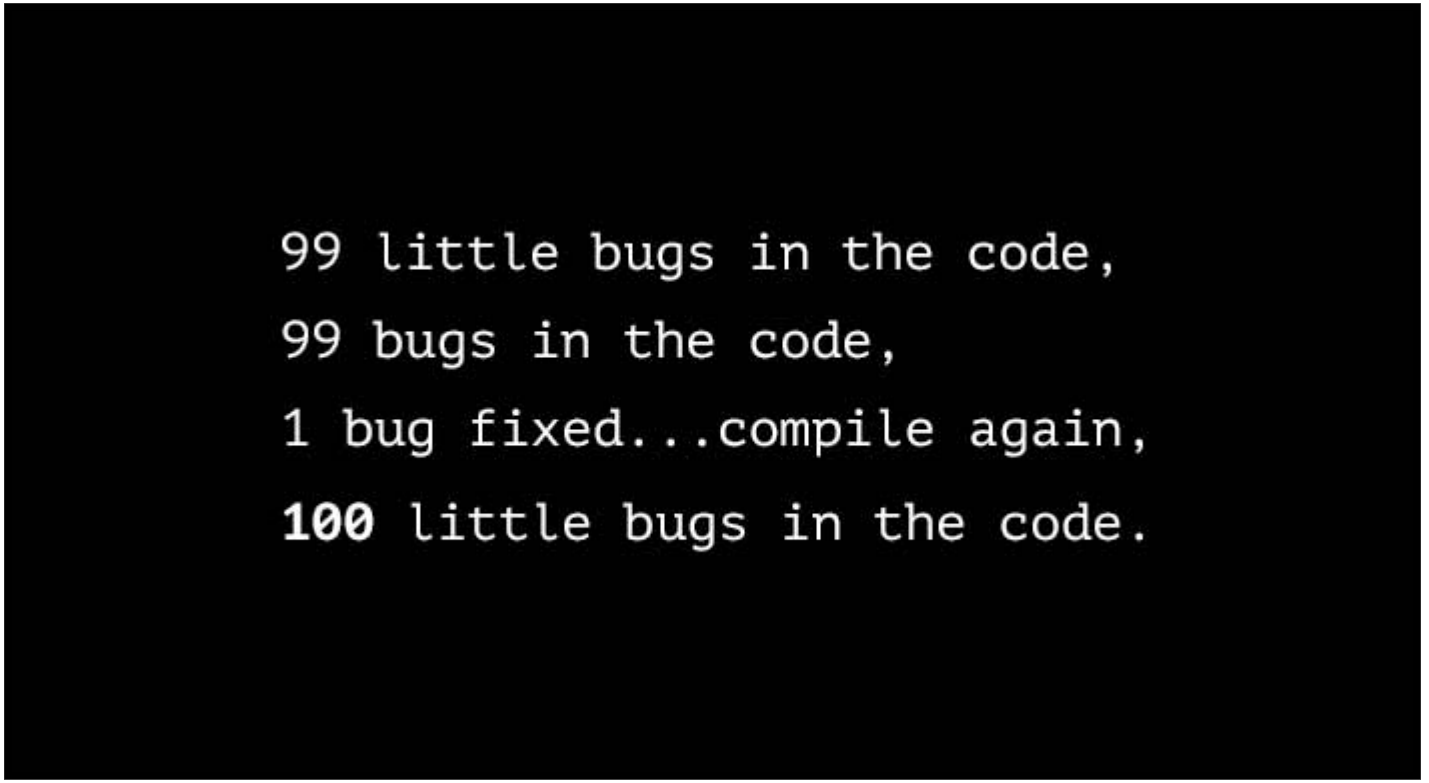

What is F#

- Supports Object Orientated programming
- Functional programming language
- Runs on .NET
- Xamarin support for cross-platform mobile developement
- Developed by Microsoft
- Fully supported by Microsoft tools

F# Forms Hello World

```
1: type App() =
2:   inherit Application()
3:
4:   let stack = new StackLayout(VerticalOptions = LayoutOptions.Center)
5:   let label = Label(XAlign = TextAlignment.Center,
6:                     Text = "Welcome to F# Xamarin.Forms!")
7:   do
8:     stack.Children.Add(label)
9:         base.MainPage <- ContentPage(Content = stack)
```

Working through a simple app

- UI to square a number
- input, button, output
- Handle failure
- Still a little challenging

The UI

```
let stack = new StackLayout(
                VerticalOptions = LayoutOptions.FillAndExpand)

let first = Entry()
let button = Button(Text = "Square")
let output = Label(XAlign = TextAlignment.Center, Text = "")

do
    stack.Children.Add(first)
    stack.Children.Add(button)
    stack.Children.Add(output)
    this.Content <- stack
```

A note about the Syntax

- F# uses spaces instead commas for parameters
- F# uses indetentation instead of curly braces

I think we need a function

```
1: let square x = x * x
```

- pure function
- will always return the same result with same input
- no mocking required
- type inference; it's an int

Button handlers

```
1: // ...
2:
3: let output = new Label(XAlign = TextAlignment.Center, Text = "")
4: let buttonHandler x = ()  // Goal is to implement this
5:
6: do
7:     button.Clicked.AddHandler (new EventHandler(fun x -> buttonHandler))
8:     stack.Children.Add(first)
9:     // ...
```

Following the types

- use types to model the domain
- more types the better!
- design the types to ensure correctness
- follow the types till it compiles

First attempt

```
1: // square: int -> int
2: // first.text: string
3: // output.Text: string
4:
5: // hmm this is not going to work
6: let buttonHandler x =
7:     output.Text <- (square first.Text)  // no compile
```

Pattern matching

Coming to C#

```
1: // this function will help
2: Int32.TryParse : string -> (bool * int)
3:
4: // tryParse: string -> int option
5: let tryParse x =
6:     let result = Int32.TryParse x
7:     match result with
8:         | true, v    -> Some v
9:         | false, _   -> None
```

Handling failure

- why not just check result of tryParse?
- error prone
- Option type is a nicer abstraction
- better compiler errors

Option type

```
1: type Option =
2:     | Some of a'
3:     | None
```

- encapsulates the case of failure
- very similar to a list with only 1 item
- built into F#

Using Option

```
1: // Call tryParse, then check result, retuning a string
2: let result = match tryParse first.Text  with
3:         | Some y -> (square y).ToString()
4:         | None   -> "enter a number"
5: // Won't coimple if missing either Some or None
6:
```

The final handler

```
1: let buttonHandler x =
2:   let result = match tryParse first.Text  with
3:                | Some y -> (square y).ToString()
4:                | None   -> "enter a number"
5:   output.Text <- result
```

What have we learned

- A stronger type system helps for the error case
- type inference makes the solution flexible
- Option is great for moddelling

Data types

- the option type represented failure
- you can write your own types
- immutablity is free
- F# is built to handle data

Awesome things not covered

- type providers
- units of measure
- property based testing
- F# has great support for parallelism:
- async and MailboxProcesser

Thast a wrap

- I hope you learning someting
- Any questions?