

Advanced C#

Functional craziness in your favorite language

Oliver Sturm

@olivers

oliver@oliversturm.com



Oliver Sturm

- Training Director at DevExpress
- Consultant, trainer, author, software architect and developer for over 25 years
- Microsoft C# MVP
- Contact: oliver@oliversturm.com

Agenda

- Ideas of Functional Programming
- Functional Modularization and Function Construction
- Monads

Basic Functional Ideas

- Avoiding side-effects
- Pure functions should only return results of calculations

Being Functional in Algorithms

Functional Modularization

- Basic idea of Functional Programming: use functions as building blocks
- Tools
 - Composition
 - Currying
 - Partial Application

Techniques of Function Construction

Composition, Currying and Partial Application

Tackling Monads

- Seen Brian Beckman's video? Here: <http://osturm.me/1Kx0zUb>
- Don't worry, no math needed here!
- Monad in Haskell is a typeclass
- A typeclass summarizes types that have things in common

Tackling Monads

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- Monad is

```
class M<T> {  
    public M(T v) { }
```

- A typeclass
things is

```
    M<T> Bind(Func<T, M<T>> g) { }
```

Nop and Maybe Monads

Using Pure Functions in C#

- Matter of discipline!
- Handling side effects is hard
 - Even in simple cases like the Console demo apps, there seems to be lots of stuff happening on the side
 - Example: output

Logger Monad

SelectMany Magic

- Check out this SelectMany overload from System.Linq.Enumerable. Remind you of anything?

```
public static IEnumerable<TR> SelectMany<TS, TR>(
    this IEnumerable<TS> source,
    Func<TS, IEnumerable<TR>> selector)
{...}
```

Binding with SelectMany

Summary

- Monads can be done in C#
- Powerful mechanism to handle state and side effects as a separate aspect from the algorithmic implementation
- Syntax support in C# is hard to come by, so the results can be strange looking
- Adhering to Monad patterns is a matter of discipline

Thank You

Please feel free to contact me about the
content anytime.

oliver@oliversturm.com