

# Applicative Parsing

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## Hour 1: Applicative

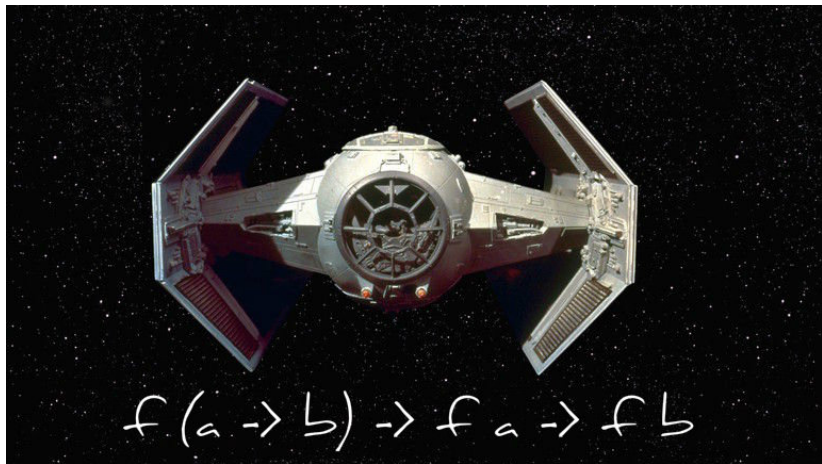


Figure 1: Tie Fighter of Doom

# Functor

```
fmap :: (a -> b) -> f a -> f b
```

# Monad

- ▶ ... is a kind of functor.
- ▶ but the  $(a \rightarrow b)$  of `fmap` has become an  $(a \rightarrow f\ b)$

## fmap vs bind

```
fmap :: Functor f => (a -> b) -> f a -> f b
```

```
(>>=) :: Monad m => m a -> (a -> m b) -> m b
```

## flip bind

```
fmap :: Functor f => (a -> b) -> f a -> f b
```

```
(=<<) :: Monad m => (a -> m b) -> m a -> m b
```

## Join

```
join :: Monad m => m (m a) -> m a
```

# Monad



# Applicative



Figure 2: I have altered the Functor.

# Applicative

```
(<*>) :: Applicative f => f (a -> b) -> f a -> f b
```

# Applicatives vs Monads

- ▶ context sensitivity
- ▶ composability (applicatives compose; monads need transformers)

## Applicative vs Monad

```
doSomething = do
  a <- f
  b <- g
  c <- h
  pure (a, b, c)
```

```
doSomething' n = do
  a <- f n
  b <- g a
  c <- h b
  pure (a, b, c)
```

# AccValidation

- ▶ like an Either, but accumulates error values
- ▶ cannot have a Monad instance

# ApplicativeDo

- ▶ language extension
- ▶ allows use of `do` syntax with applicatives

# Alternative

- ▶ a monoid on applicative functors!

```
class Applicative f => Alternative f where
  -- / The identity of '<|>'
  empty :: f a
  -- / An associative binary operation
  (<|>) :: f a -> f a -> f a
```

## Hour 2: Electric Boogaloo

In this hour, we'll be working on a small project with the `optparse-applicative` library.



## Example

- stack new optex simple
- stack exec optex

# Options.Applicative.Builder

Here are some basic argument types we can use: commands, flags, switches.

```
command :: String -> ParserInfo a -> Mod CommandFields a
```

Add a command to a subparser option.

# Flag and flag'

```
flag :: a -> a -> Mod FlagFields a -> Parser a
--      [1]   [2]           [3]           [4]
```

1. default value
2. active value
3. option modifier
4. Builder for a flag parser

# Switch

```
switch :: Mod FlagFields Bool -> Parser Bool
```

– flagEx.hs

## helpful builders

```
subparser :: Mod CommandFields a -> Parser a
```

```
-- Builder for a command parser.
```

```
strArgument :: Mod ArgumentFields String -> Parser String
```

```
-- Builder for a String argument.
```

```
argument :: ReadM a -> Mod ArgumentFields a -> Parser a
```

```
-- Builder for an argument parser.
```

## information we can provide about arguments

```
short :: HasName f => Char -> Mod f a
```

```
-- Specify a short name for an option.
```

```
long :: HasName f => String -> Mod f a
```

```
-- Specify a long name for an option.
```

```
metavar :: HasMetavar f => String -> Mod f a
```

```
-- Specify a metavariable for the argument.
```

## Options.Applicative.Extra

```
execParser :: ParserInfo a -> IO a
```

Run a program description.

Parse command line arguments. Display help text and exit if any parse error occurs.