

# What the ?\$% is a monad?!

A lightning introduction to  
functional programming





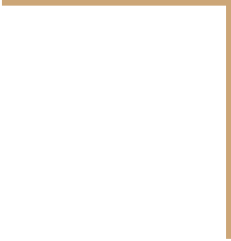
“a monad is a Stream in Java”






It's a functional programming thing.





Oh yeah, of course...



# Functional Programming is...

Courtesy of Wikipedia

a **programming paradigm** that treats computation as the evaluation of mathematical functions and avoids changing-state and mutable data

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A programming paradigm is a mental model  
for how to think about programming.



# Imperative v. Declarative Programming Paradigms

**Imperative** programming paradigms say you should think about code as telling the computer what to do.

We most often think of this as “programming”, probably because that’s how computer hardware works.

**Object oriented** programming is a specific type of imperative programming.

**Declarative** programming paradigms say you should think about code as describing what you want done, not how to do it.

You ***declare*** what you want

**SQL** - you the question you want the answer to (your query), and you don’t worry about how the database does the computation.

**HTML** - you describe how you want the page to look, not how the web browser should do the rendering

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# Mathematical v. “Programming” Function

A **function** in programming land is:

*a named section of a program that performs a specific task.*

Think:

```
int doubleThis(int x) {  
    return 2*x;  
}
```

But you might do something complicated:

```
void processMessage() {  
    process(queue.pop())  
}
```

A **function** in math land is:

*a rule for taking inputs to outputs*

Think:

$$f(x) = 2x$$

You can't do anything more complicated.

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evaluation of mathematical  
functions **and avoids**  
**changing-state and mutable data***

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# State & Mutable Data

In imperative programming, you can think of **state** as the contents of the variables as your program is running.

**Mutable** data is data that can change, like those variables in your state.

What's wrong with that?!

*Incorrectly* modifying state and mutable data is pretty much the root of all bugs.

So, if we want *bug free code*, and we all do, we should get rid of state and mutable data!

Right?!

# Functional Programming is...

Courtesy of Wikipedia

*a programming paradigm that  
treats computation as the  
evaluation of mathematical  
functions and avoids changing-state  
and mutable data*

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Thank you!



Oh yeah, what's a monad?!





A monad is just a monoid in the category of  
endofunctors





But you should just think of it as a design  
pattern in functional programming.

