How I Learned to Stop Worrying and Love the Mock

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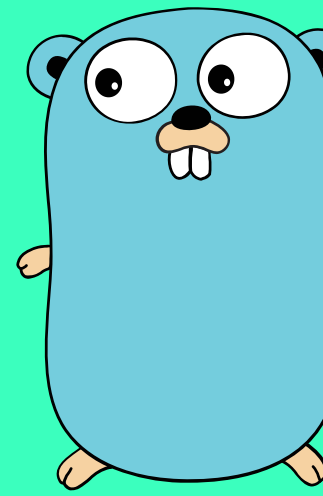
https://github.com/woodwo/how-i-learned-to-stop-worrying-and-love-the-mock

What do we have: Stage, microservices, bunch of E2E

What do we want:

- test single service locally easy way
- super-stable tests 99.99999
- test in CI
  - in single contiainer
  - after build, shift-left
- outer calls should be verified too

Use Go and mocks!



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WTM: What the Mock?!
Mock is ambiguous term!

Questions for mock term:

- Where it begins?
- How we can be sure it is a good mock?
- How can we build it efficiently for a big service?
- How we can control it?

All answers are in decomposition of code

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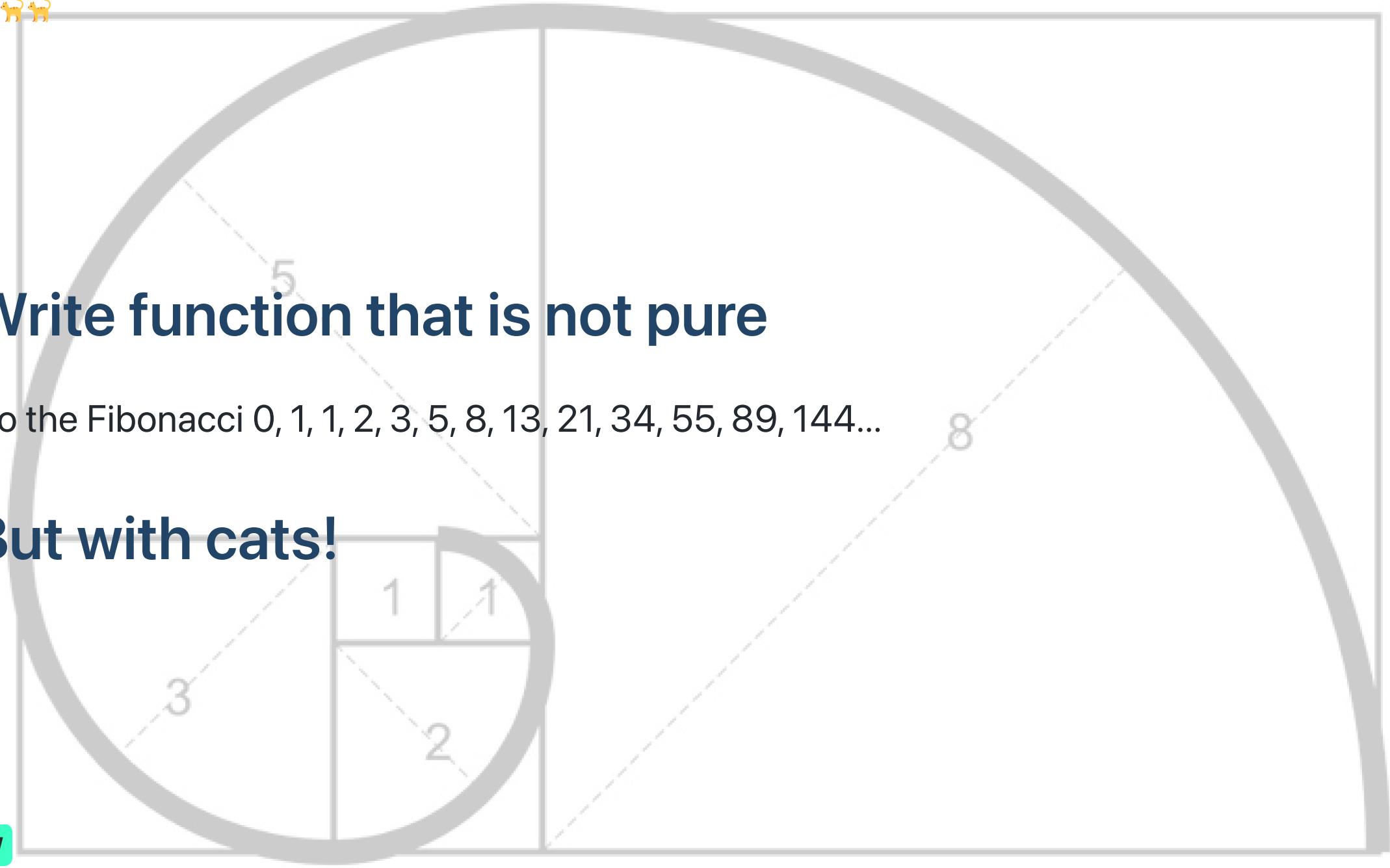
Let's start at the very beginning, a very good place to start

And we need an example of code



Write function that is not pure

Do the Fibonacci 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144...

But with cats!

All code in main.go

```
...
func fibonacci() func() int {
        b, a := 0, 1
        return func() int {
                f := b
                b, a = a, f+a
                return f
        }
}

func main () {
    f := fibonacci()
    fmt.Println(strings.Repeat("🐈", f()))
    ...
}
```

Purrfect

```
main ± > go run main.go

🐈
🐈
🐈🐈
🐈🐈🐈
...
```

Function signature: help me please

```
func function_name( [parameter list] ) [return_types]
{
   body of the function
}
```

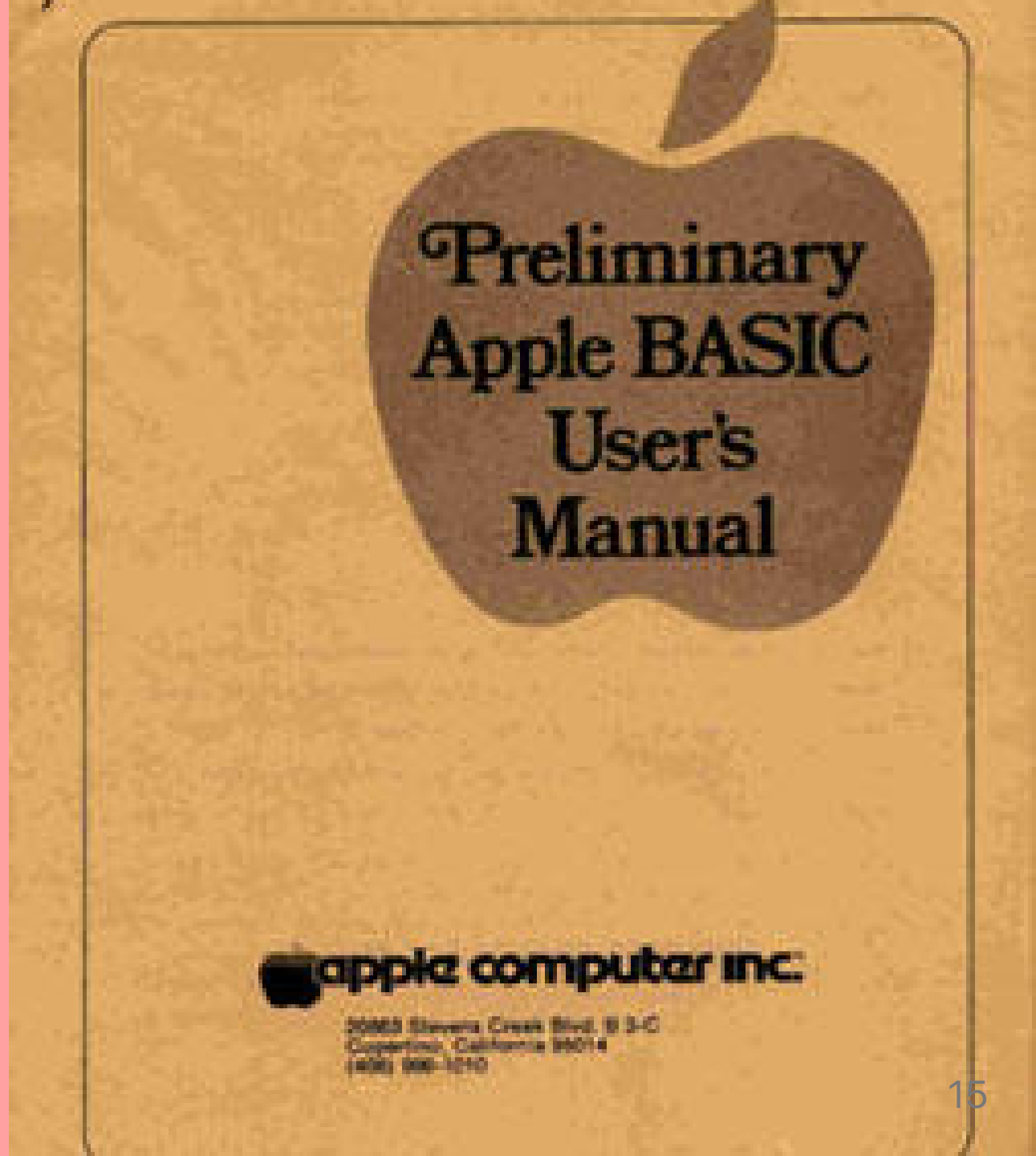
```
func fibonacci() func() int {
        b, a := 0, 1
        return func() int {
                f := b
                b, a = a, f+a
                return f
        }
}
```

Takes ...? Gives ...?

Every piece of code is in one file

- Name collisions
- No logical grouping
- Broken scroll wheel

see also What was Coding like 40 years ago?



Decomposition I: Introducing Packages

All function signatures are still well-known

calculus/calculus.go

```
package calculus

func Fibonacci() func() int {
        b, a := 0, 1

        return func() int {
                f := b
                b, a = a, f+a

                return f
        }
}
```

For mock - just write function with the same signature

main.go

```
package main

import (
        "fmt"
        "package/calculus"
)

func main () {
    f := calculus.Fibonacci()
    fmt.Println(strings.Repeat("🐈", f()))
    ...
}
```

Every piece of code is in one repo

- MR conflicts
- A lot of code owners
- Uneasy CI/CD

Read about MS repo - a repo of about 300GB

But how about monorepos?

Decomposition II: Introducing Modules

Main idea of module:

- add meta to bunch of files
- call them a package
- profit!

Perl CPAN was conceived in 1993 and has been active online since October 1995

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Go modules

- create repo
- clone it locally
- run `go mod init <repo path>`, `go.mod` file has been created
- write code
- push it back

see also: https://docs.gitlab.com/ee/development/go_guide/dependencies.html

So create calculus third-party lib

```
git clone git@github.com:woodwo/calculus_lib.git
cd calculus_lib
cp example/package/calculus.go .
go mod init git@github.com:woodwo/calculus_lib.git
go mod tidy
git add *
git commit -m 'as lib'
git push
```

Now you can import it *again*

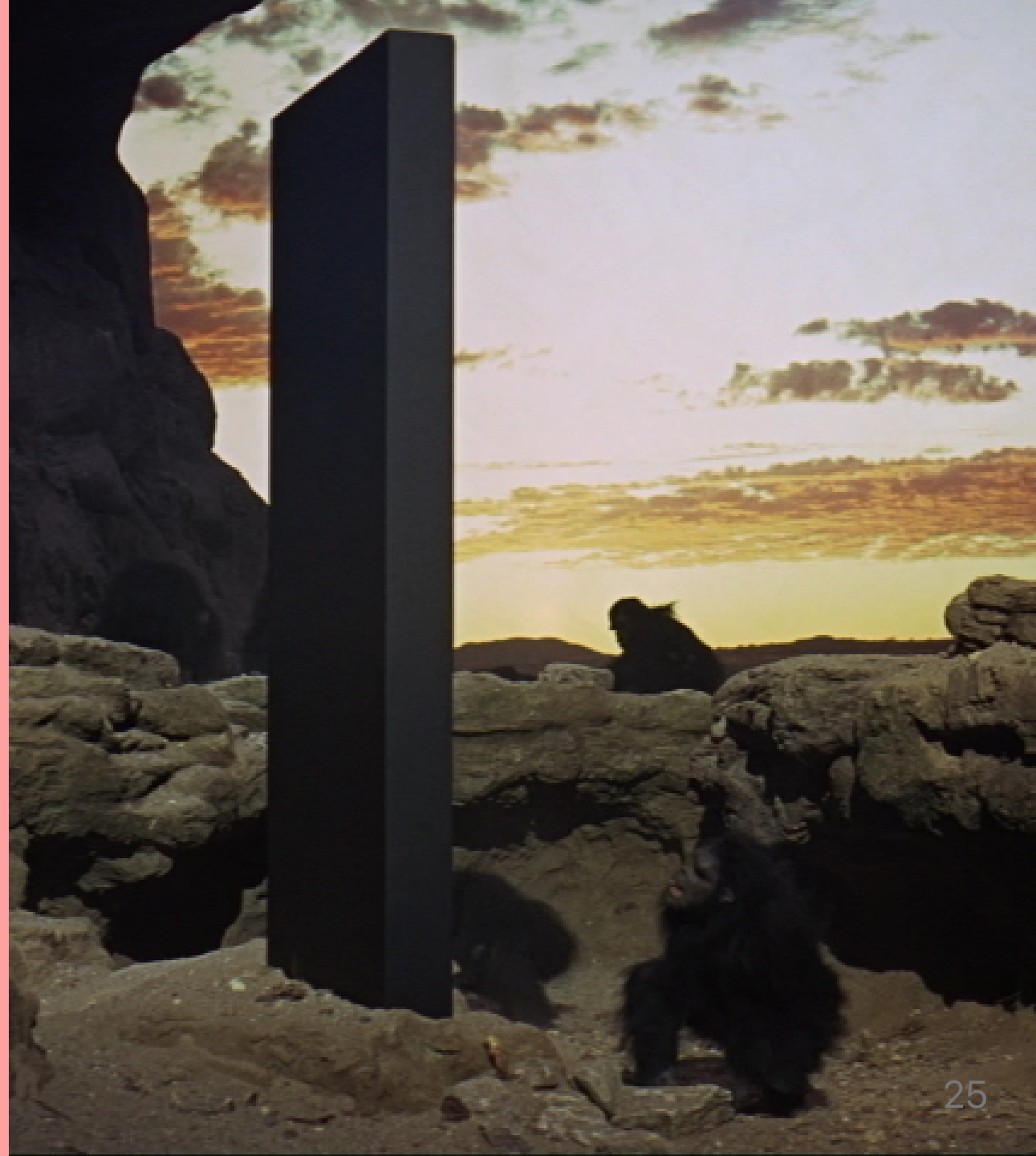
`main.go`

```
package main

import (
        "fmt"
        calculus "github.com/woodwo/calculus_lib"
)


func main () {
    f := calculus.Fibonacci()
    fmt.Println(strings.Repeat("🐈", f()))
    ...
}
```

Every piece of code is in one service

- Still hard to build
- Hard to deploy
- Hard to deliver changes

Monolithic architecture kinda.



Decomposition III: Introducing microservices

Function is still here - but on remote service.

That is why we call it RPC - remote procedure call.

But function signature is no more well-known!

We lost them when we did decoupling.

No more easy mock?

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There is always some contract between services

protobuf 3 and OpenAPI v3

You can find them in service repos, *not in Slack*

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Let's split our example to two services:

one count Fibonacci, another print `next value x` 🐈

- calculus_lib will become Calculus service
- `main.go will` become client

Write .proto for Calculus:

```
syntax = "proto3";

package calculus;

option go_package = "calculus/grpc/proto";

service calculus {
    rpc Fibonacci(Empty) returns (Value) {} // single handler
 }

message Empty { // empty parameters
}

message Value { // return int32
    int32 value = 1;
}
```

It looks same like our signature!

Generate Go code from it:

```
protoc --go_out=. --go_opt=paths=source_relative --go-grpc_out=. --go-grpc_opt=paths=source_relative,require_unimplemented_servers=false calculus.proto
```

Go devs actually autogenerate a lot of code!

protoc gave us a lot of code for Calculus server

```
handler := func(ctx context.Context, req interface{}) (interface{}, error) {
        return srv.(CalculusServer).Fib(ctx, req.(*Empty))
}
```

N.B. and also a code for Calculus client

Start a server, touch it with Evans

This is a stateful service! like others

- next value will grow
- several clients can be attached

This is a very like tabby stage!

- restart it for drop counter
- if someone touch it - your next is bumped

Let's write a client, do a tabby cats
We will use autogenerated client

```
import (
        "github.com/woodwo/calculus/grpc/proto"
    ...
)
...
        client := proto.NewCalculusClient(conn)
```

All gRPC Go services use same client for integration

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Let's test this client

Some test boundaries can be autogenerated too

Do `go build`,
start the client,
beware the cat clowder

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Client become a black box

- sometimes you can count cats
- your tests affected by other
- it is working, but you are not really sure
- you need a `./client` to be built
- we unable to test negative scenario

You also testing Calculus =(

Let's write some test on go

you've told me that on 5'th slide

NO, better just *generate them*

main_test.go

This is a still black box

- sometimes you can count cats
- your tests affected by others
- it is working, but you are not really sure
- you need a `./client` to be built - **no more**
- we unable to test negative scenario

What time is it now?

It is mock time!

We have a client? Yes

Generate some MockClient!

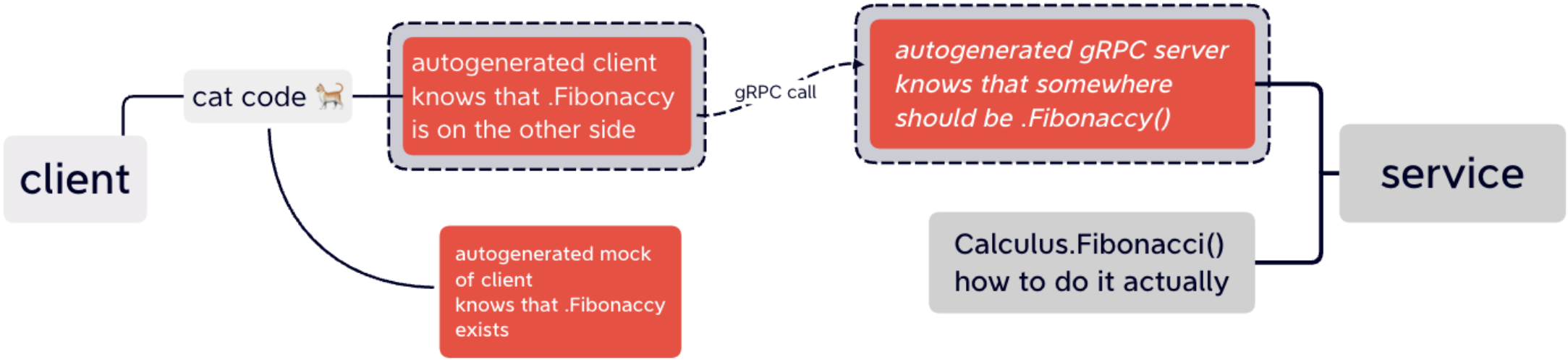
```
mockgen client/grpc/proto CalculusClient > mock_proto.go
```

... and use it

```
mockCtl := gomock.NewController(t)
defer mockCtl.Finish()
client := mock_proto.NewMockCalculusClient(mockCtl)

gomock.InOrder(
        client.EXPECT().Fib(...).Return(&proto.Value{Value: 1}, nil).Times(1),
)
```

What is just happened?



What is just happened?

Code from our services is untouched.

We replace one autogenerated client by other.

Other client have the same interfaces, he is a mock!

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Pros

- we test only Client
- we do not need `./client` to be built
- we do not affected by stage, no fixtures
- we sure that external service was called
- we write small amount of code
- we can test negative scenario

Cons

- we have to keep im mind integration test with real services
- maintenance overhead for mocks

Thanks. Go mock.

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