Introduction to Watermill

Simple Go Event-Driven application in 20 minutes

FOSDEM 2023
Robert Laszczak

roblaszczak

Introduction to Watermill

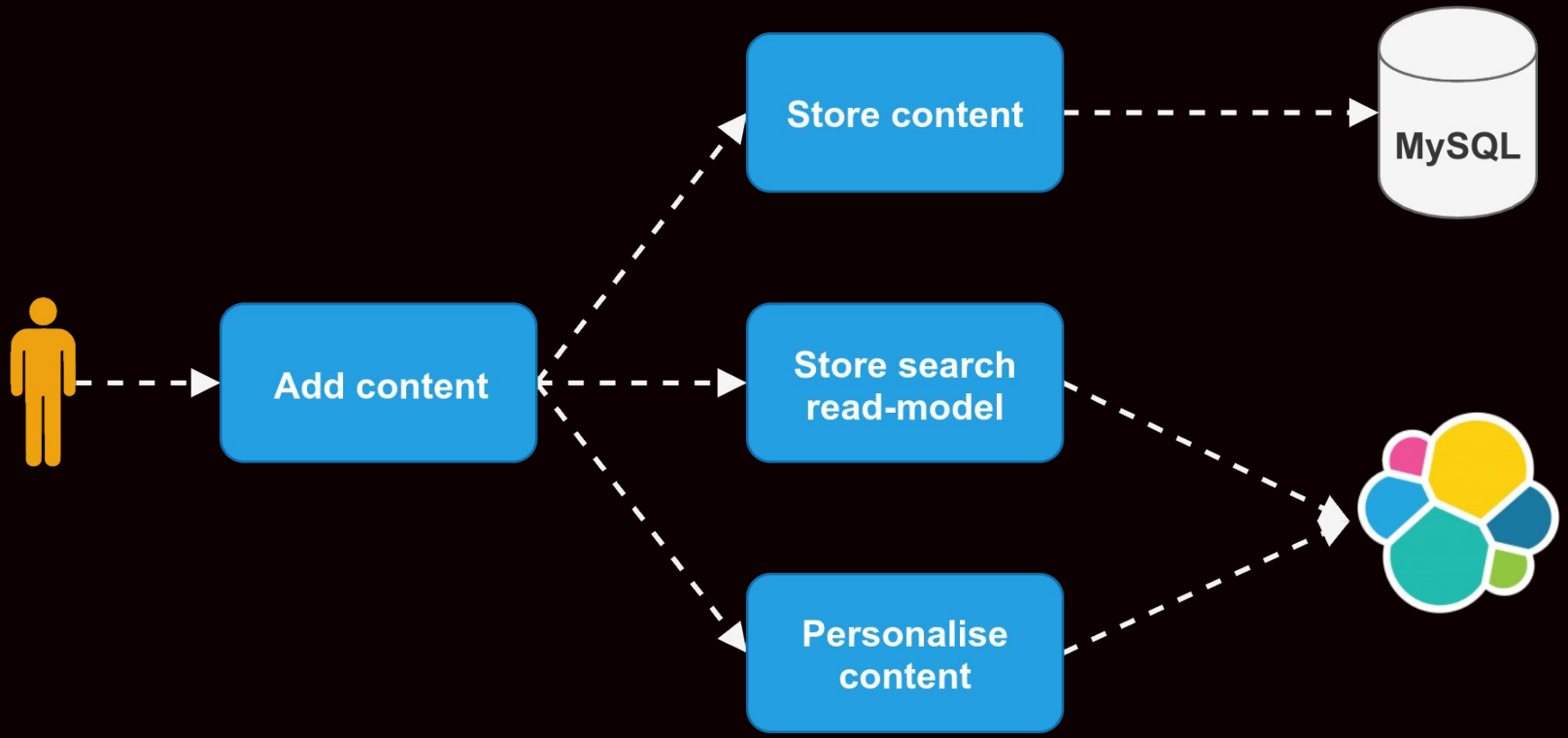
Simple Go Event-Driven application in ~~20~~ 15 minutes

FOSDEM 2023
Robert Laszczak

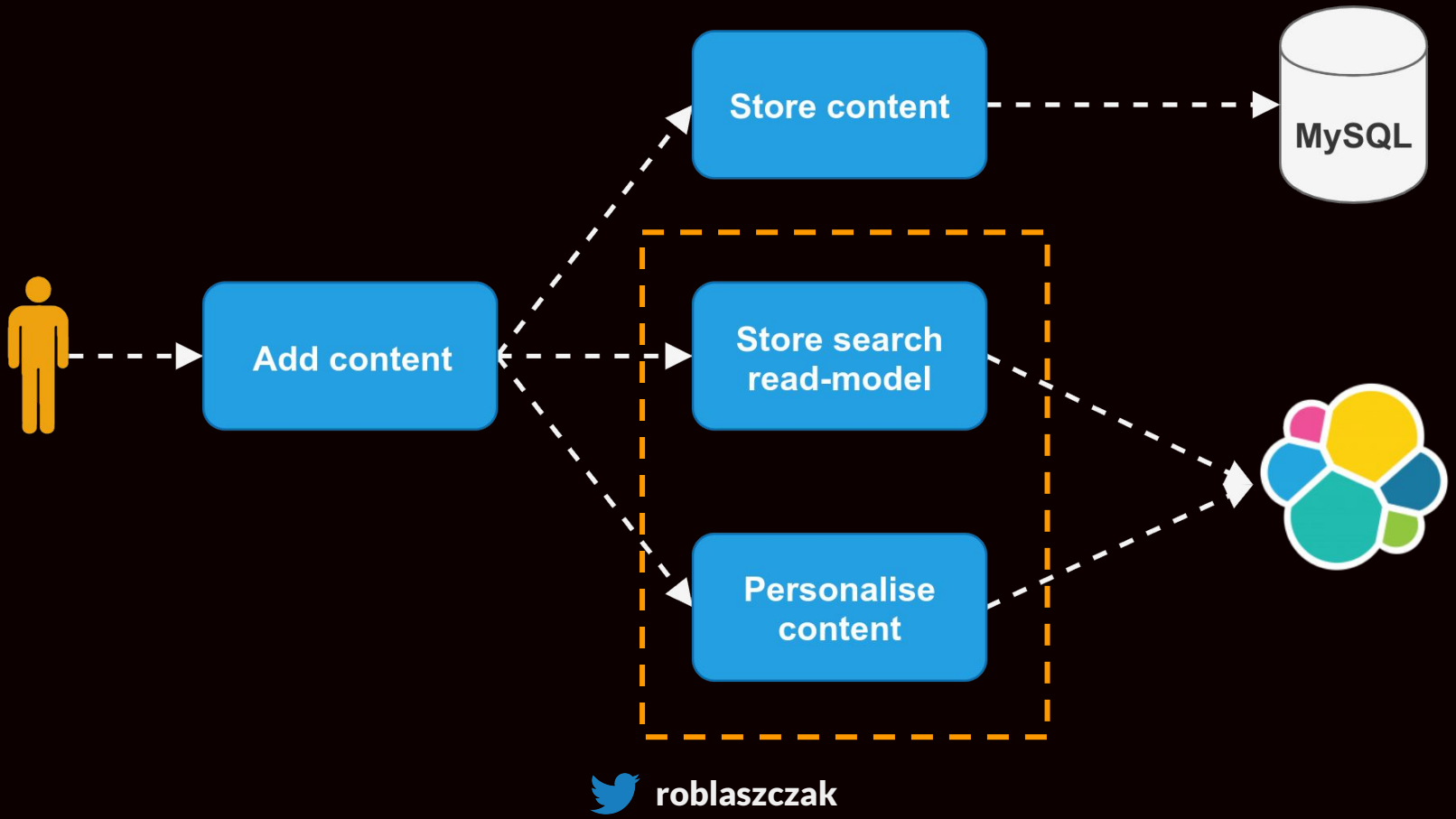
roblaszczak

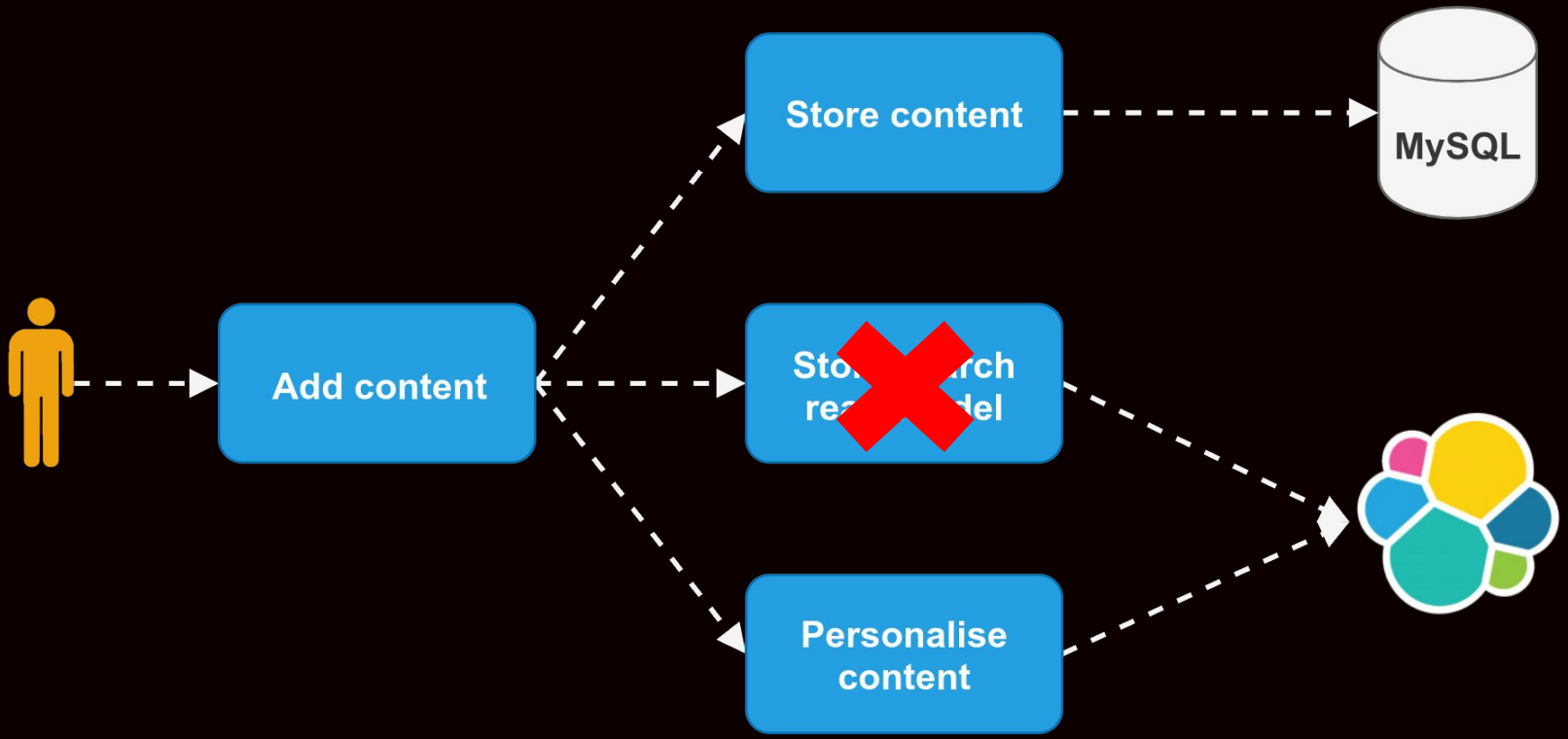
Hey, I’m Robert

- Principal Engineer at /id
- Blogging at **threedots.tech**
- @roblaszczak at
- @roblaszczak.techsub.social at
- robert [at] threedotslabs.com
- Author of Watermill

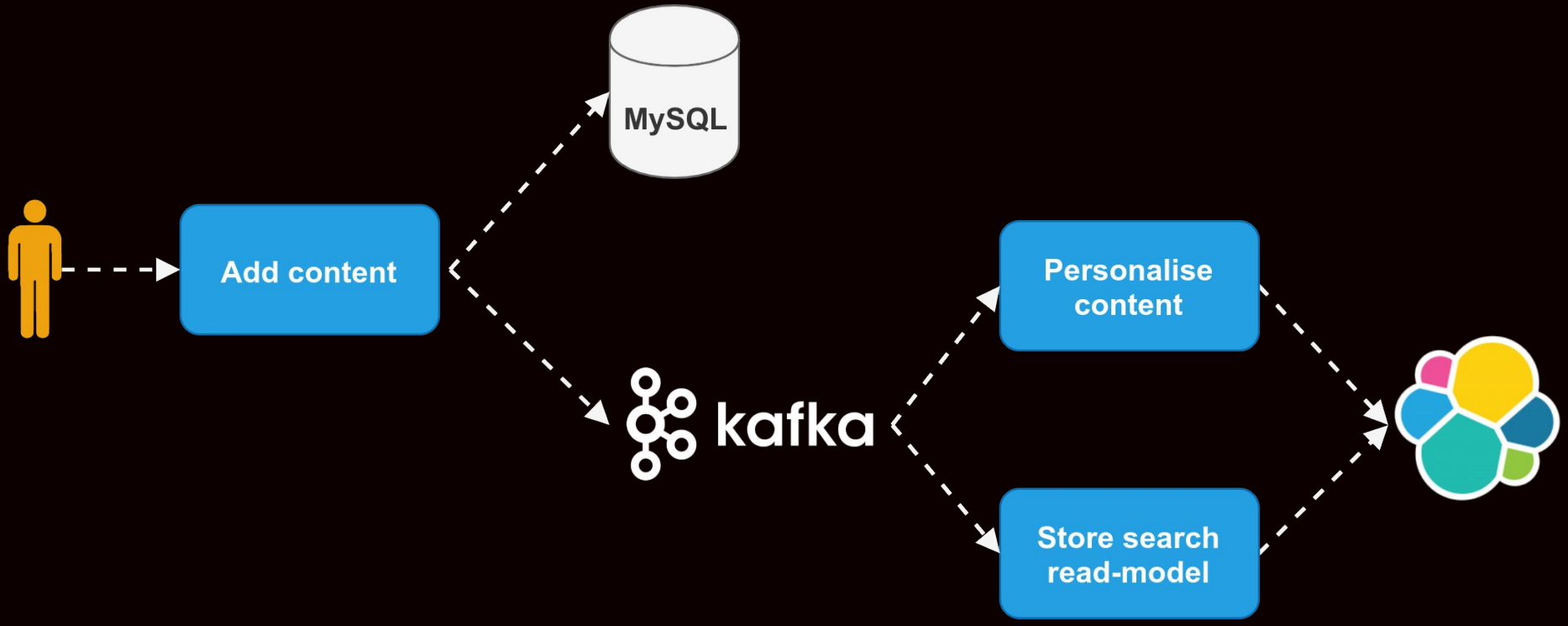


roblaszczak


Store content
MySQL
Add content
Store search read-model
Personalise content
roblaszczak



roblaszczak


MySQL
Add content
kafka
Personalise content
Store search read-model

PROBLEM?

BUILDING EVENT-DRIVEN APPLICATIONS IS NOT EASY

Event driven concepts

- Consumer groups
- Partitioning
- Message ordering
- At-least-once delivery
- Message Ack and Nack support
- Poison queues
- **Not losing any message**

How to make building event-driven applications easy in Go?

Watermill

+5k

GitHub Stars

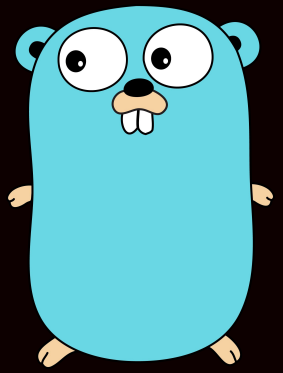
roblaszczak

50+

Contributors

12

Officially Supported Pub/Subs



kafka

BoldDB

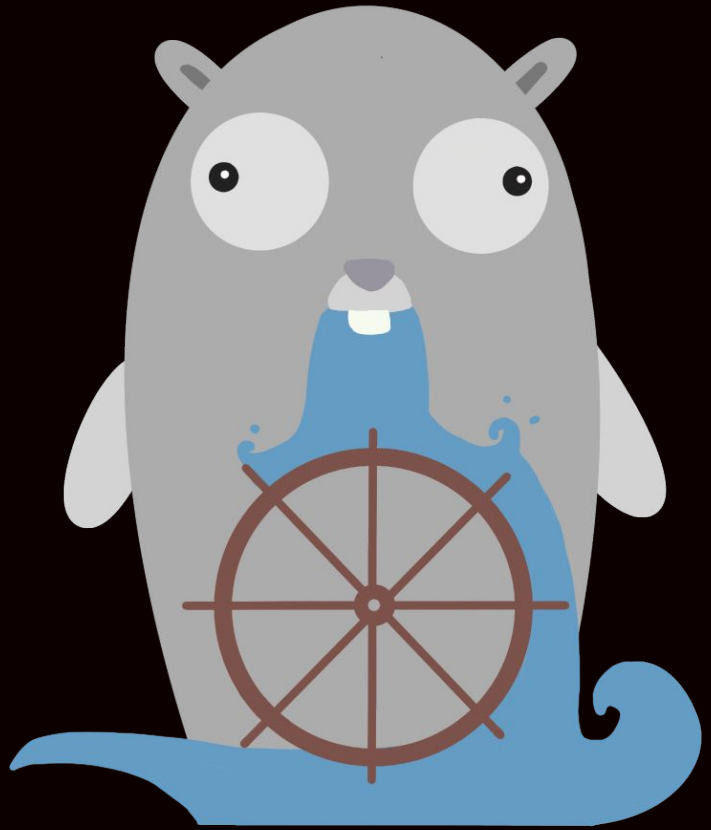
redis

NATS

RabbitMQ

MySQL™

roblaszczak



roblaszczak

HTTP concepts that you usually don’t think about

- TLS
- 7 layers of network stack
- Connection pooling
- Redirect handling
- Handling different protocol versions
- Handling network transient problem

Watermill is not a framework

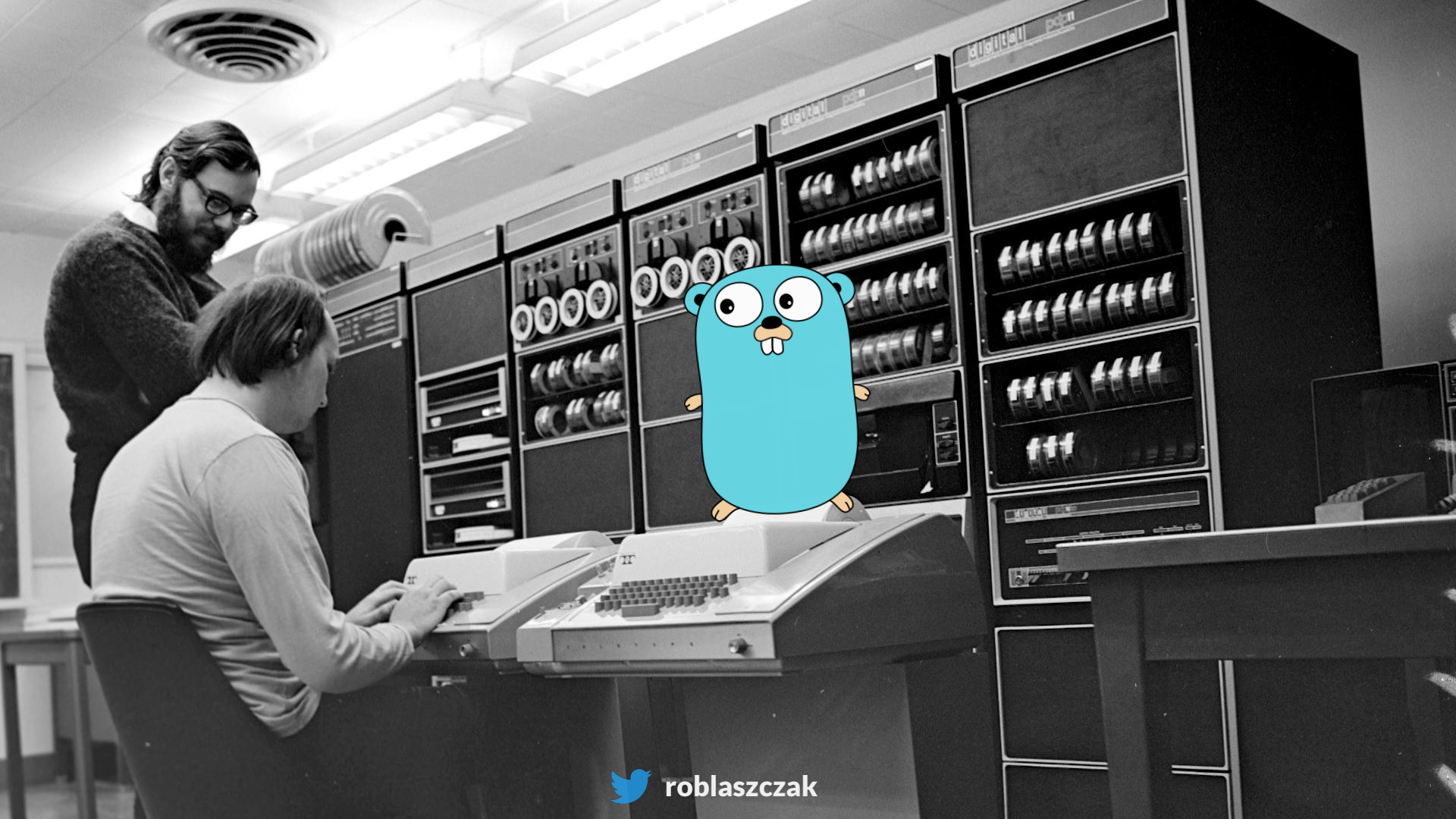
Watermill is a library

HOW?

Unix philosophy (1978)

- Write programs that **do one thing and do it well**.
- Write programs to **work together**.
- Write programs to handle ~~text streams~~ **message, because that is a universal interface**.


roblaszczak

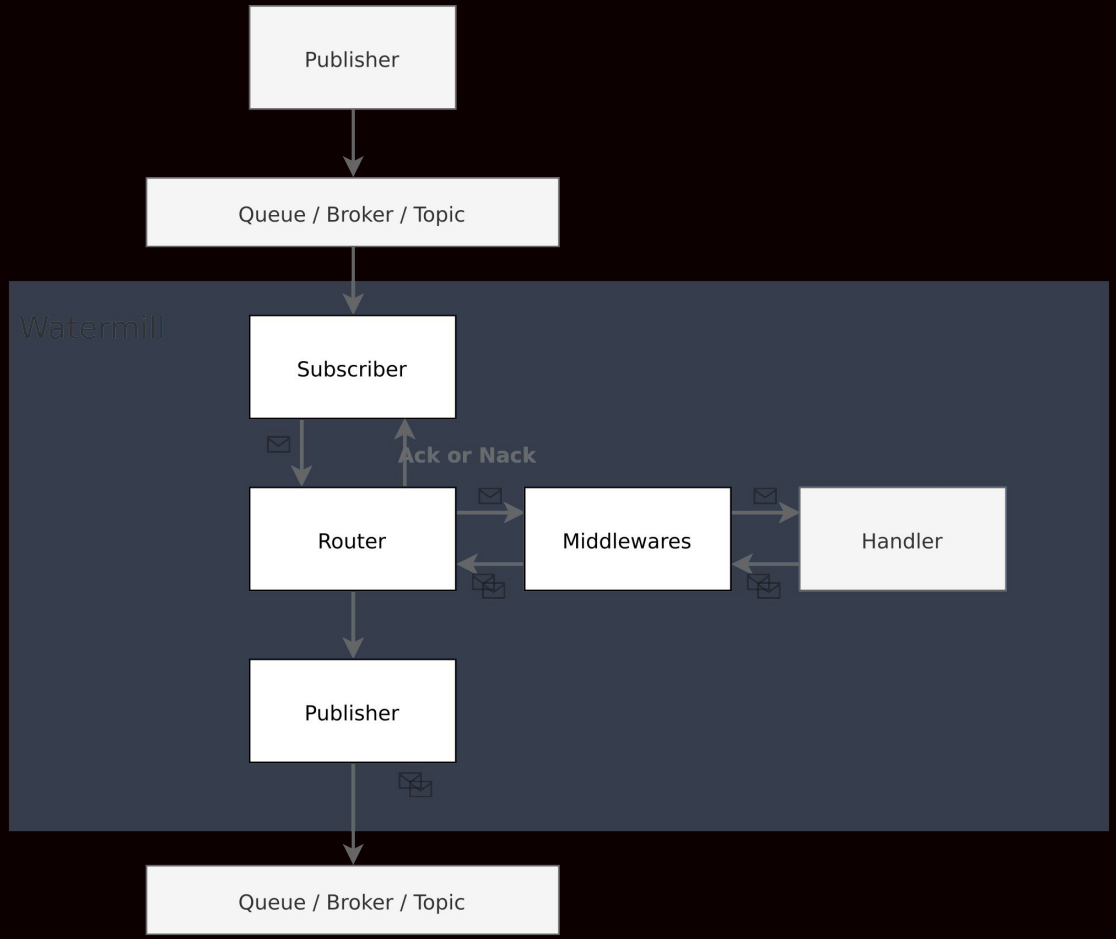

roblaszczak


roblaszczak

```
type Message struct {
  UUID string

  Metadata map[string]string

  Payload []byte
}
```

```go
type Publisher interface {

    Publish(topic string, messages ...*Message) error

    Close() error

}

type Subscriber interface {

    Subscribe(ctx context.Context, topic string) (<-chan *Message, error)

    Close() error

}
```

```
type HandlerFunc func(msg *Message) ([]*Message, error)
```



roblaszczak

Middlewares

- Timeout
- Instant Ack
- Correlation
- Poison
- Retry
- Throttle
- Random fail
- Duplicator
- Recoverer
- Ignore Errors

Testing

```go
func TestPublishSubscribe(t *testing.T) {
    features := tests.Features{
        ConsumerGroups:      true,
        ExactlyOnceDelivery: false,
        GuaranteedOrder:     false,
        Persistent:          true,
    }

    tests.TestPubSub(
        t,
        features,
        createPubSub,
        createPubSubWithConsumerGrup,
    )
}
```

```go
var stressTestTestsCount = 10

func TestPubSubStressTest(
    t *testing.T,
    features Features,
    pubSubConstructor PubSubConstructor,
    consumerGroupPubSubConstructor ConsumerGroupPubSubConstructor,
) {
    for i := 0; i < stressTestTestsCount; i++ {
        t.Run(fmt.Sprintf("%d", i), func(t *testing.T) {
            t.Parallel()
            TestPubSub(t, features, pubSubConstructor, consumerGroupConstructor)
        })
    }
}
```


roblaszczak

How fast is Watermill?

Pub/Sub	Publish (messages / s)*	Subscribe (messages / s)*
Kafka	70,252	117,529
NATS	76,208	38,169
SQL (MySQL)	6,989	143
Google Cloud Pub/Sub	7,416	39,591
AMQP	2,408	10,608

*1 instance, 1 process, Docker Compose

The first rule of live coding

Don’t do livecoding

The first rule of live coding

roblaszczak

Not covered

- It’s hard to create production grade app in 15 minutes :) (even HTTP based)
- Kafka and Google Cloud Pub/Sub internals
- At-least-once delivery
- CQRS component

That’s a lot!

Where I should start?

Documentation

Getting started

Watermill up and running

Message

Message is one of core parts of Watermill

Pub/Sub

Publishers and Subscribers

Message Router

The Magic Glue of Watermill

CQRS Component

Command Query Responsibility Segregation (CQRS) Component

Implementing custom Pub/Sub

Bring Your Own Pub/Sub

Metrics

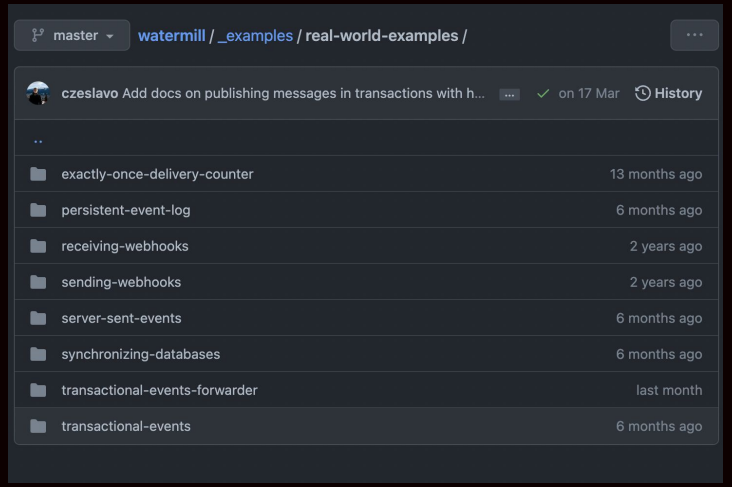
Monitor Watermill in realtime

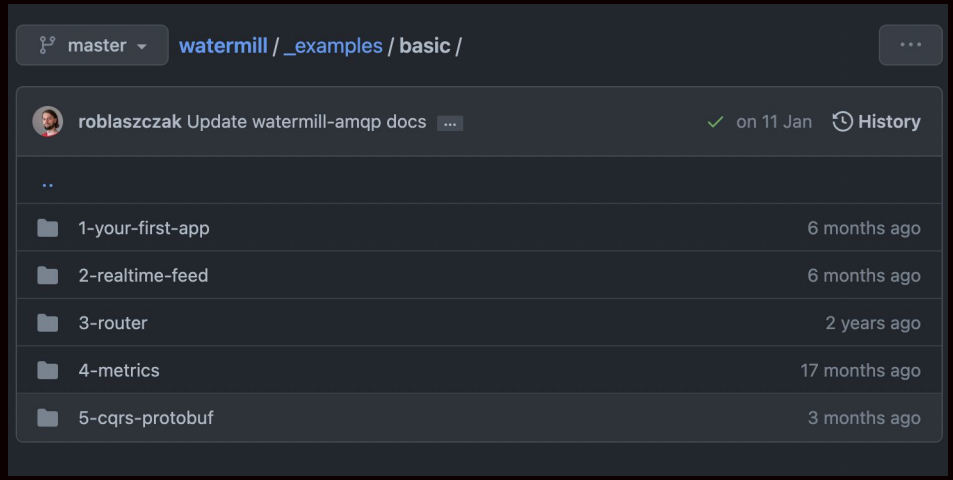
Middlewares

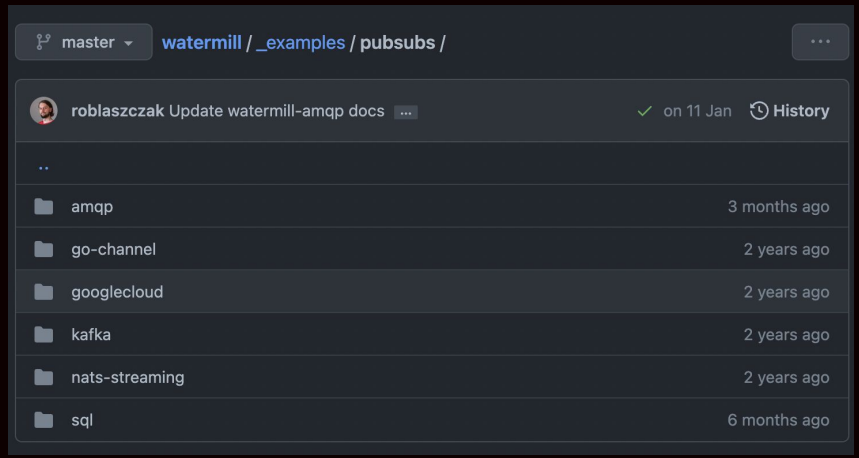
Add generic functionalities to your handlers in an inobtrusive way

Troubleshooting

When something goes wrong







roblaszczak

Thanks for all contributors!

roblaszczak

Watermill v1.2 

Online Release party: **March 1st**

THANKS!

https://threedots.tech/fosdem2023/