My first year with event-sourcing

...

PHP Nijmegen. 2018-06-20

My first year with event-sourcing

...

NMGN.tech. 2018-06-20

Tim Huijzers
@Dragem
Developer @ drukwerkdeal.nl
Deventer NL

First Try

- Limited knowledge
- No experience
- No ES framework
- Doomed from the start

Second Try

- Limited knowledge
- Limited experience
- New Framework
- New DI manager
- New ES Framework
- Doomed To Fail

Third Try

- Some knowledge
- Some experience
- Known framework
- known database
- known ES framework
- Still doomed

I KNOW WHAT I'M DOING!

KBS
KBS
KBS
HIGHLY ACCLAIMED
KBS
Founders
Brewing
Founders
THE AMAZING KOSMICETS
HIGHLY ACCLAIMED
KBS
A FLAVORED STOUT
IS GOOD FOR EVERYTHING A FLAVORED STOUT OUGHT TO BE GOOD FOR
ALE BREWED WITH CHOCOLATE AND COFFEE AGED IN OAK BOURBON BARRELS
KBS
KBS

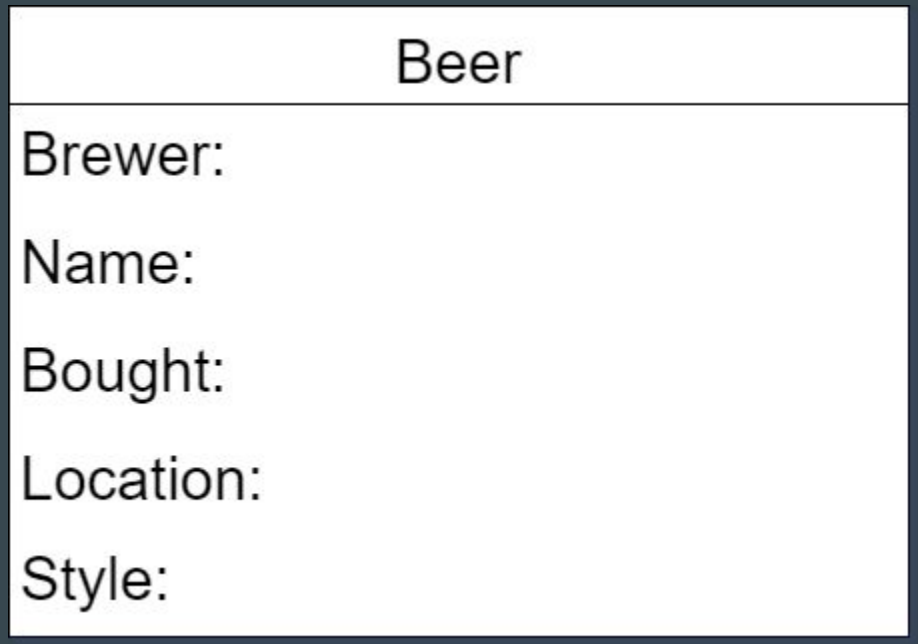
BeerWarehouse

Why use Event Sourcing

CRUD

We will save a new entry in our system because we just bought it and will store it in the fridge for later.

If we change the location the system only knows about that location.



We drank it so it’s not in the system anymore

We want to keep a history of everything we drank.

I want to know when I drank this in my history.

But that’s only for new beers.

THAT'S NOT
GOOD ENOUGH

Events

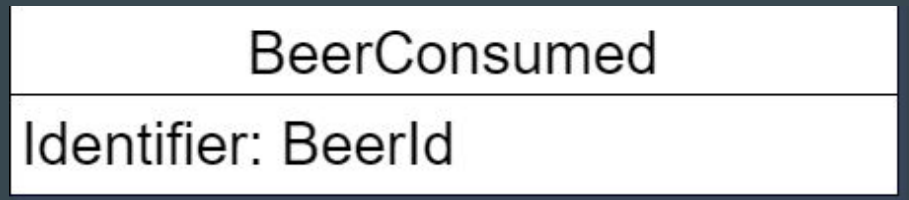
Same Information as before + Explicit action about what happened

Make Small Events

Removed Location and changed name because in the real world you might not know this yet.

When returning home I put the beer in my fridge

I need room in my fridge so I take it out. Using the same Event



And at last a event about when I consumed it.

BRILLIANT!

Crud

- I know what beer I have.
- I know when it was consumed.
- I know where it is.

Event-Sourcing

- I know what beer I have.
- I know when it was consumed.
- I know where it is.
- I know where it was before.
- I know when it was moved.
- I know where it was at any point in time
- I know how many times it was moved.
- I know when it was added to the system.
- I know what else was moved in that day.

“Every software program relates to some activity or interest of its user.”

Eric Evans, Domain-Driven Design: Tackling Complexity in the Heart of Software

#SISTERSMOVIE
I LIKE THE STORY IT TELLS

When To Use Event Sourcing

- You need an audit log
- You like scalability
- You want to separate the read and write of an application
- You want to replay event on a dev machine to get an accurate situation of what the state was at a point in time.
- You want reporting but don’t know what yet.
- You are done with mapping objects to tables

When NOT To Use Event Sourcing

- You only need a simple CRUD system.
- You are processing a lot of personal data.
- You just want to query a lot of things on the DB
- You are starting on a big project for production

Event Sourcing in code

Prooph

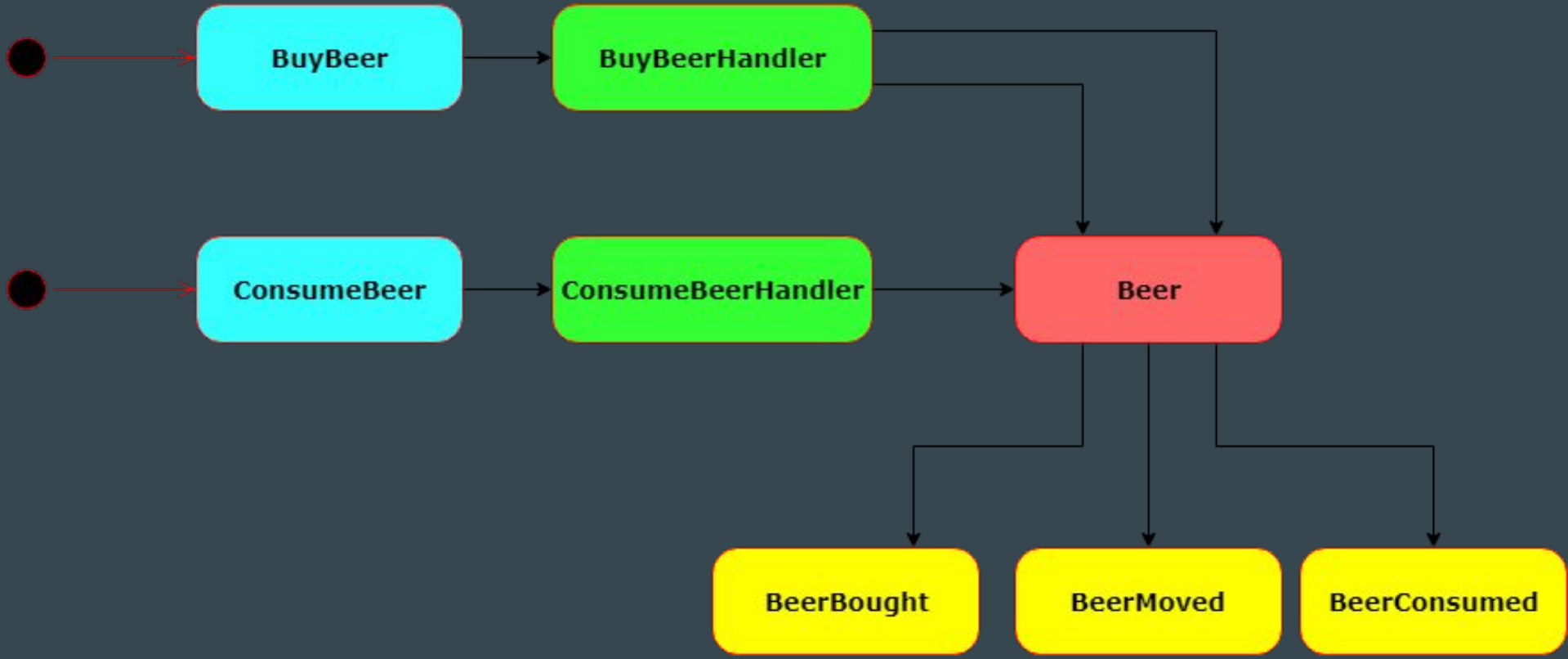
http://getprooph.org/

THE CQRS AND EVENT SOURCING COMPONENTS FOR PHP

Crafted for Your Enterprise App

INSTALL

TAKE A TOUR


BuyBeer
BuyBeerHandler
ConsumeBeer
ConsumeBeerHandler
Beer
BeerBought
BeerMoved
BeerConsumed

Command

```php
final class BuyBeer extends Command implements PayloadConstructable
{
    use PayloadTrait;
    public static function forWarehouse(
        string $brewer,
        string $name,
        string $style,
        ?string $location = null
    ): BuyBeer {
        return new self([
            'brewer' => $brewer,
            'name' => $name,
            'style' => $style,
            'location' => $location
        ]);
    }
```

```php
public function brewer(): Brewer
{
    return Brewer::fromString($this->payload['brewer']);
}
public function name(): BeerName
{
    return BeerName::fromString($this->payload['name']);
}
public function style(): BeerStyle
{
    return BeerStyle::fromString($this->payload['style']);
}
public function location(): Location
{
    return Location::fromString($this->payload['location']);
}
```

```php
protected function setPayload(array $payload): void
{
    $this->payload = $payload;
}
```

```php
final class ConsumeBeer extends Command implements PayloadConstructable
{
    use PayloadTrait;
    public static function forWarehouse(
        string $beerId
    ): ConsumeBeer {
        return new self([
            'beerId' => $beerId
        ]);
    }

    public function beerId(): BeerId
    {
        return BeerId::fromString($this->payload['id']);
    }

    protected function setPayload(array $payload): void
    {
        $this->payload = $payload;
    }
}
```

Command Handler

```php
final class BuyBeerHandler
{
    private $beerCollection;

    public function __construct(BeerCollection $beerCollection)
    {
        $this->beerCollection = $beerCollection;
    }

    public function __invoke(BuyBeer $command): void
    {
        $beer = Beer::buyBeer(
            $command->brewer(),
            $command->name(),
            $command->style()
        );
        $beer->moveTo($command->location());
        $this->beerCollection->save($beer);
    }
}
```

```php
final class ConsumeBeerHandler
{
    private $beerCollection;

    public function __construct(BeerCollection $beerCollection)
    {
        $this->beerCollection = $beerCollection;
    }

    public function __invoke(ConsumeBeer $command): void
    {
        $beer = $this->beerCollection->getBeer($command->beerId());
        $beer->consume();
        $this->beerCollection->save($beer);
    }
}
```

Aggregate

```php
public static function buyBeer(
    Brewer $brewer,
    BeerName $name,
    BeerStyle $style
): Beer {
    $self = new self();
    $beerId = BeerId::fromString((string)Uuid::uuid4());
    $self->recordThat(BeerBought::withData($beerId, $brewer, $name, $style));
    return $self;
}

public function moveTo(Location $location): void
{
    $this->recordThat(BeerMoved::withData($this->beerId, $location));
}

public function consume(): void
{
    $this->recordThat(BeerConsumed::now($this->beerId));
}
```

Event

```php
final class BeerBought extends AggregateChanged
{
    public static function withData(
        BeerId $beerId,
        Brewer $brewer,
        BeerName $name,
        BeerStyle $style
    ): BeerBought {
        $event = self::occur(
            (string)$beerId,
            [
                'brewer' => (string)$brewer,
                'name' => (string)$name,
                'style' => (string)$style
            ]
        );

        $event->beerId = $beerId;
        $event->brewer = $brewer;
        $event->name = $name;
        $event->style = $style;
        $event->date = BoughtDate::fromDateTime($event->createdAt());

        return $event;
    }
```

```php
public function id(): BeerId
{
    if (null === $this->beerId) {
        $this->beerId = BeerId::fromString($this->aggregateId());
    }
    return $this->beerId;
}

public function brewer(): Brewer
{
    if (null === $this->brewer) {
        $this->brewer = Brewer::fromString($this->payload['brewer']);
    }
    return $this->brewer;
}

public function name(): BeerName{...}

public function style(): BeerStyle{...}

public function date(): BoughtDate
{
    if (null === $this->date) {
        $this->date = BoughtDate::fromDateTime($this->createdAt());
    }
    return $this->date;
}
```

```php
final class BeerMoved extends AggregateChanged
{
    private $beerId;
    private $location;

    public static function withData(BeerId $beerId, Location $location): BeerMoved
    {
        $event = self::occur(
            (string)$beerId,
            [
                'location' => (string)$location
            ]
        );

        $event->beerId = $beerId;
        $event->location = $location;

        return $event;
    }
```

```php
public function id(): BeerId
{
    if (null === $this->beerId) {
        $this->beerId = BeerId::fromString($this->aggregateId());
    }
    return $this->beerId;
}

public function location(): Location
{
    if (null === $this->location) {
        $this->location = Location::fromString($this->payload['location']);
    }
    return $this->location;
}
```

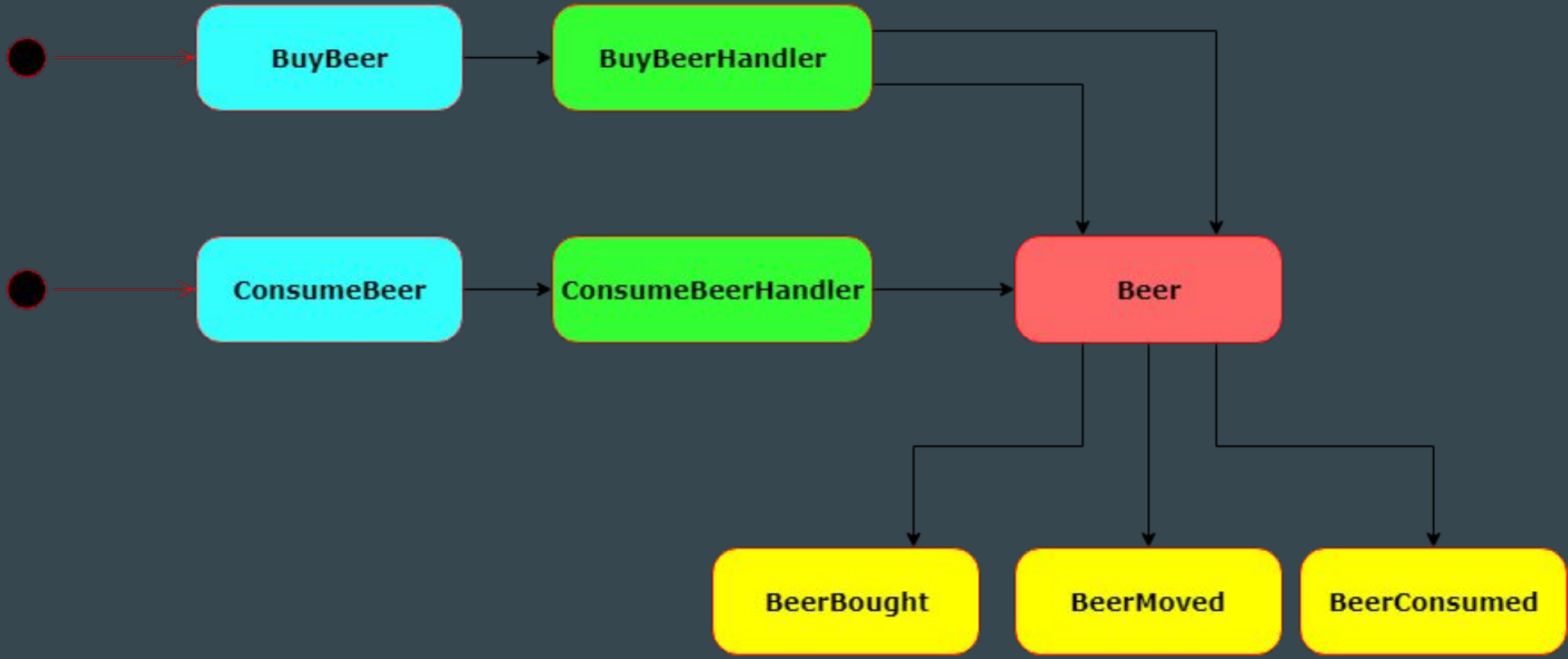
```php
final class BeerConsumed extends AggregateChanged
{
    private $beerId;
    private $date;

    public static function now(BeerId $beerId): BeerConsumed
    {
        $event = self::occur(
            (string)$beerId,
            []
        );
        $event->date = ConsumeDate::fromDateTime($event->createdAt());
        $event->beerId = $beerId;

        return $event;
    }
```

```php
public function id(): BeerId
{
    if (null === $this->beerId) {
        $this->beerId = BeerId::fromString($this->aggregateId());
    }
    return $this->beerId;
}

public function date(): ConsumeDate
{
    if (null === $this->beerId) {
        $this->date = ConsumeDate::fromDateTime($this->createdAt());
    }
    return $this->date;
}
```

Back to the Aggregate

```php
protected function whenBeerWasBought(BeerBought $event): void
{
    $this->brewer = $event->brewer();
    $this->name = $event->name();
    $this->style = $event->style();
    $this->bought = $event->date();
}
protected function whenBeerWasMoved(BeerMoved $event): void
{
    $this->location = $event->location();
}
protected function whenBeerWasConsumed(BeerConsumed $event): void
{
    $this->consumed = $event->date();
}
protected function apply(AggregateChanged $event): void
{
    switch(true) {
        case $event instanceof BeerBought:
            $this->whenBeerWasBought($event);
            break;
        case $event instanceof BeerMoved:
            $this->whenBeerWasMoved($event);
            break;
        case $event instanceof BeerConsumed:
            $this->whenBeerWasConsumed($event);
            break;
    }
}
```

```php
public function brewer(): Brewer
{
    return $this->brewer;
}
public function name(): BeerName
{
    return $this->name;
}
public function style(): BeerStyle
{
    return $this->style;
}
public function boughtOn(): BoughtDate
{
    return $this->bought;
}
public function consumedOn(): ConsumeDate
{
    return $this->consumed;
}

protected function aggregateId(): string
{
    return (string)$this->beerId;
}
```


BuyBeer
BuyBeerHandler
ConsumeBeer
ConsumeBeerHandler
Beer
BeerBought
BeerMoved
BeerConsumed

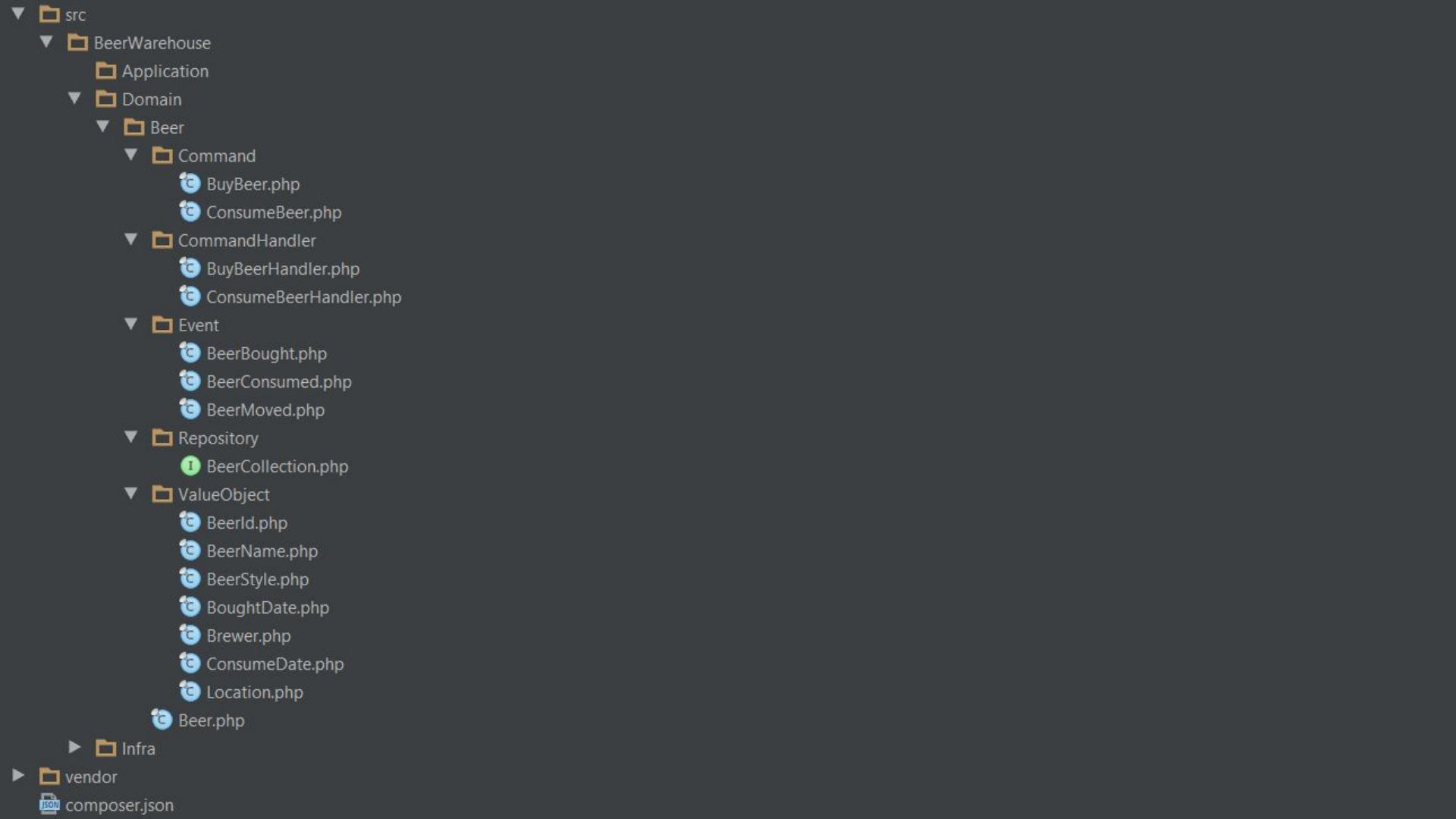
GREAT SUCCESS!

Think About Side Effects

```php
interface BeerCollection
{
    public function save(Beer $beer);

    public function getBeer(BeerId $beerId): Beer;
}
```

LIVE
RNC
2016
We are going to build a
great boarder wall!

Structuring your application


src
BeerWarehouse
Application
Domain
Beer
Command
BuyBeer.php
ConsumeBeer.php
CommandHandler
BuyBeerHandler.php
ConsumeBeerHandler.php
Event
BeerBought.php
BeerConsumed.php
BeerMoved.php
Repository
BeerCollection.php
ValueObject
BeerId.php
BeerName.php
BeerStyle.php
BoughtDate.php
Brewer.php
ConsumeDate.php
Location.php
Beer.php
Infra
vendor
composer.json

Understanding the DB

event_streams
no
event_id
event_name
payload
metadata
created_at
aggregate_version
aggregate_id
aggregate_type

How many beers do I have?

How many different styles do I have?

How many beers have I drank last 30 days?

Projection

A Projection allows you to loop through all event (past and present) and build your own views.

- Read Model
  - Define the data you would like to use.
- Projection
  - Loops through the events and applies that data to your view
- Finder
  - Helps you find data from that view.

```php
final class BeerProjection implements ReadModelProjection
{
    public function project(ReadModelProjector $projector): ReadModelProjector
    {
        $projector->fromStream( streamName: 'event_steam')
            ->init(function (): array {
                return [];
            })
            ->when([
                BeerBought::class => function($state, BeerBought $event) {
                    /** @var BeerReadModel $readModel */
                    $readModel = $this->readModel();
                    $readModel->stack( type: 'insert', [
                        'id' => (string)$event->id(),
                        'brewer' => (string)$event->brewer(),
                        'name' => (string)$event->name(),
                        'style' => (string)$event->style(),
                        'bought_on' => (string)$event->date()
                    ]);
                },
```

```php
            BeerMoved::class => function($state, BeerMoved $event) {
                /** @var BeerReadModel $readModel */
                $readModel = $this->readModel();
                $readModel->stack( type: 'update', [
                    'id' => (string)$event->id(),
                    'location' => (string)$event->location()
                ]);
            },
            BeerConsumed::class => function($state, BeerConsumed $event) {
                /** @var BeerReadModel $readModel */
                $readModel = $this->readModel();
                $readModel->stack( type: 'delete', [
                    'id' => (string)$event->id(),
                ]);
            }
        ]);
    return $projector;
}
```

Pitfalls

Refactoring is harder, think about your architecture

Mon
Tue-Thur
Fri-Sat
Sunday

Versioning

- Change an Event but support the old version
- Make a new Event
- Make the Event right from the start

Something wrong with the event

Event are immutable, So don’t change them

- Try solving it another way first.
- Correct errors with new events
- Try a upcaster
- Make a new stream and fill it with mutated events (and test)
- Change the events in the database

But what if I have like 100 trillion gazillion events?

LEBRON BE LIKE..
MIAMI
6
CALM THAT SH*T DOWN!
quickmeme.com

Snapshots

You Do Not Need Snapshots From The start

Trigger on Event Count

Pure Event Sourcing Is Not A Holy Grail

Do Not Save Personal Data In Events

Make Projections For All You Lists

Try It In A Hackathon First

Most Of The Time Your DB Is Not Holy

What Now?

http://getprooph.org/

THE CQRS AND EVENT SOURCING COMPONENTS FOR PHP

Crafted for Your Enterprise App

INSTALL

TAKE A TOUR

prooph / proophessor-do-symfony

Watch 19 | Star 80 | Fork 33

Code | Issues 4 | Pull requests 0 | Projects 0 | Wiki | Insights

Symfony version of proophessor-do CQRS + Event Sourcing example app http://getprooph.org/

75 commits | 1 branch | 0 releases | 11 contributors

Branch: master | New pull request | Create new file | Upload files | Find file | Clone or download

prolic use mysql 5.7 only — Latest commit cf0989f 6 days ago

.docker	Rewrite to use flex and prooph v7	7 months ago
bin	Add EventStoreMgmtUi	2 months ago
config	Merge pull request #25 from UFOMelkor/hotfix/projections	7 days ago
docs	Add EventStoreMgmtUi	2 months ago
public	Add EventStoreMgmtUi	2 months ago
src	Add EventStoreMgmtUi	2 months ago

Source

https://github.com/prooph/proophessor-do-symfony

http://getprooph.org/

Other Tools

- Broadway
  - No Upcaster,
  - No Snapshots,
  - No Replaying
- Axon
  - Upcasting by MessageFactory,
  - Snapshots by Trigger on event count,
  - Replaying by Example code for replay
- Akka
  - Upcasting by Event Adapter,
  - Snapshots decided by actor,
  - Replaying

Thanks, Any Questions?

Example code from talk on:
https://github.com/webbaard/BeerWarehouse

TOKYO*

Caracole
JEVER

PAULANER
6X
BROUWERIJ DE MOLEN BIER
KBS
A FLAVORED STOUT