My first year with event-sourcing

•••

PHP Tilburg. 2018-07-12

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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

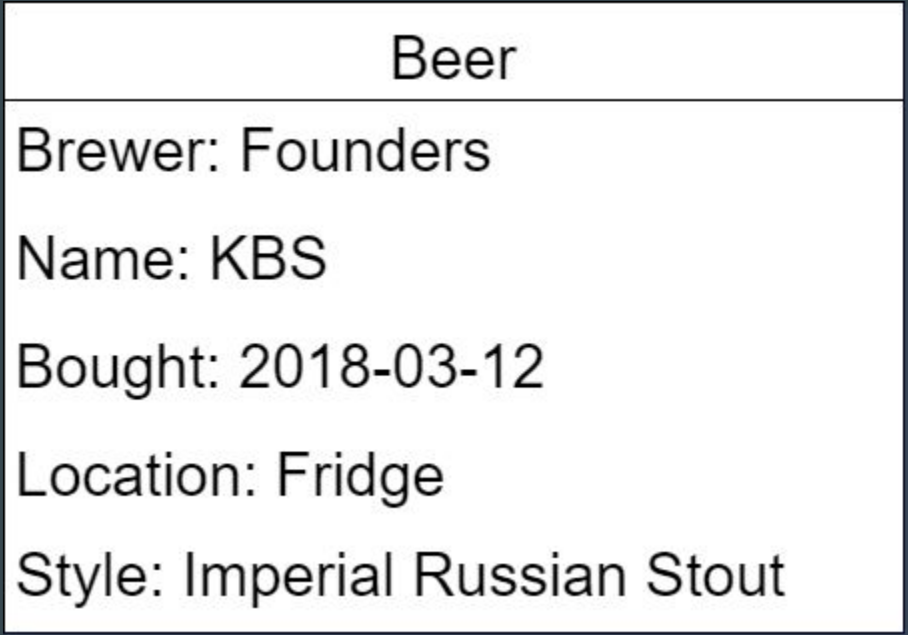
I KNOW WHAT I'M DOING!

Founders Brewing Co.
The Amazing Kosmicky's
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

BeerWarehouse

Why use Event Sourcing

CRUD


Beer

Brewer: Founders

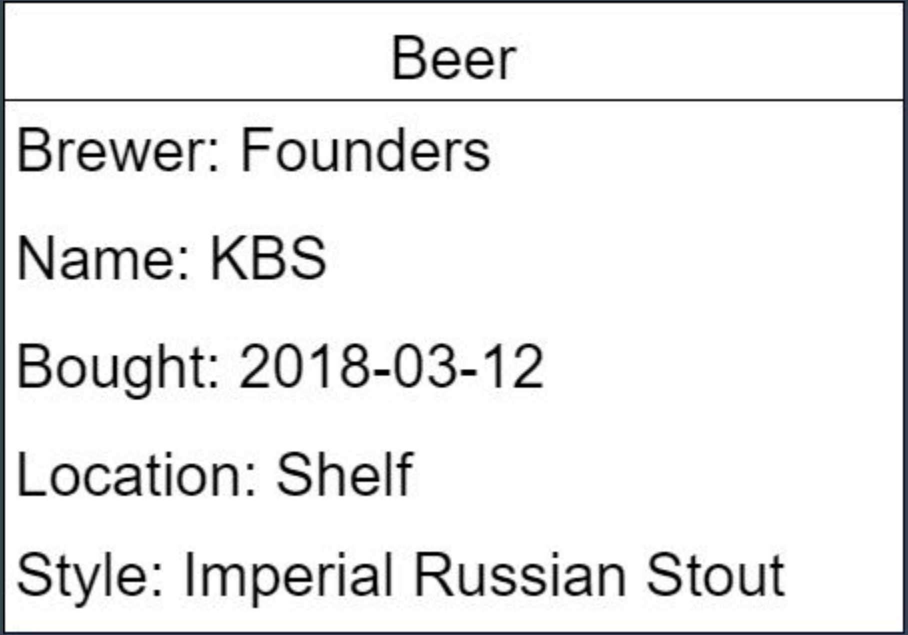
Name: KBS

Bought: 2018-03-12

Location: Fridge

Style: Imperial Russian Stout

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



Beer

Brewer: Founders

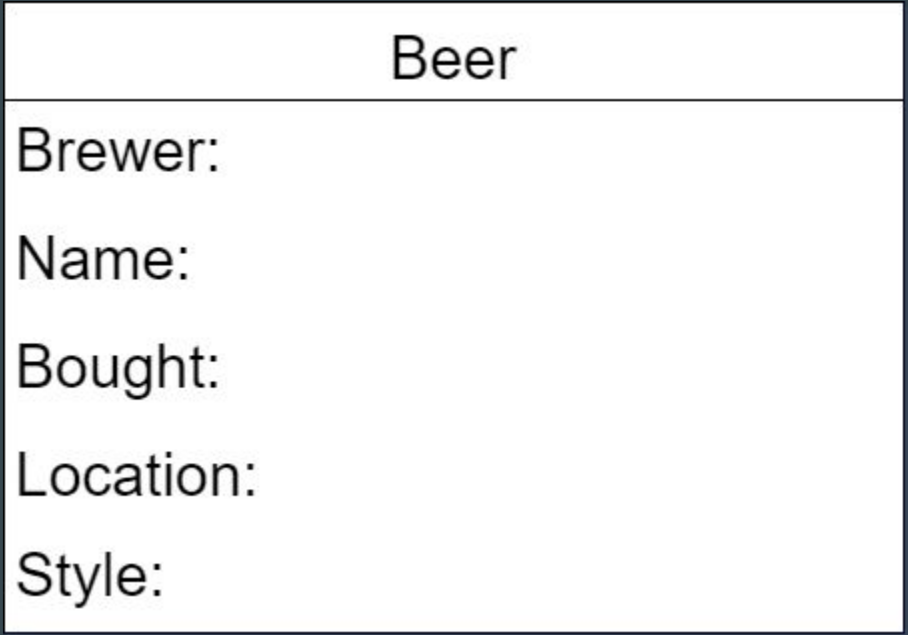
Name: KBS

Bought: 2018-03-12

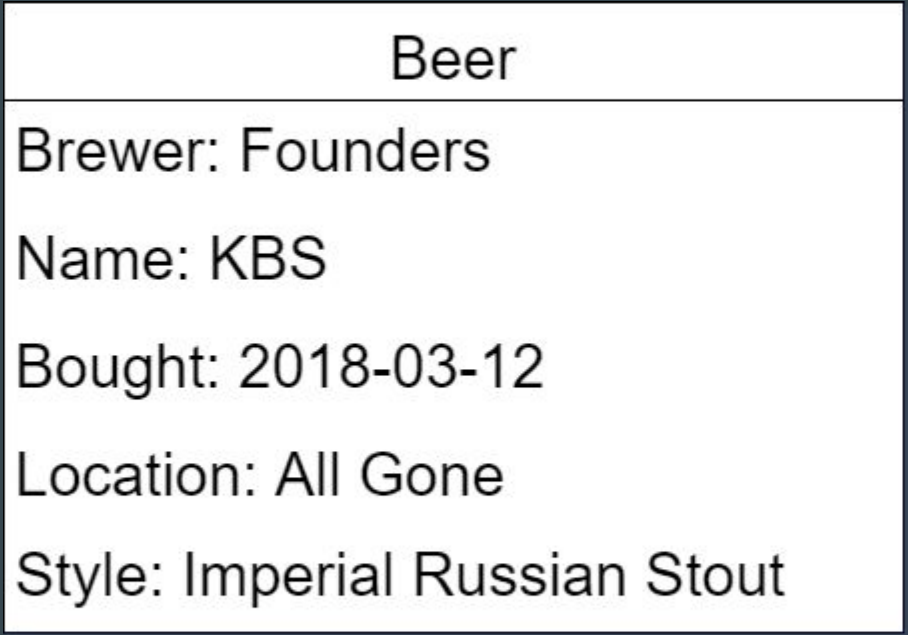
Location: Shelf

Style: Imperial Russian Stout

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



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


Beer

Brewer: Founders

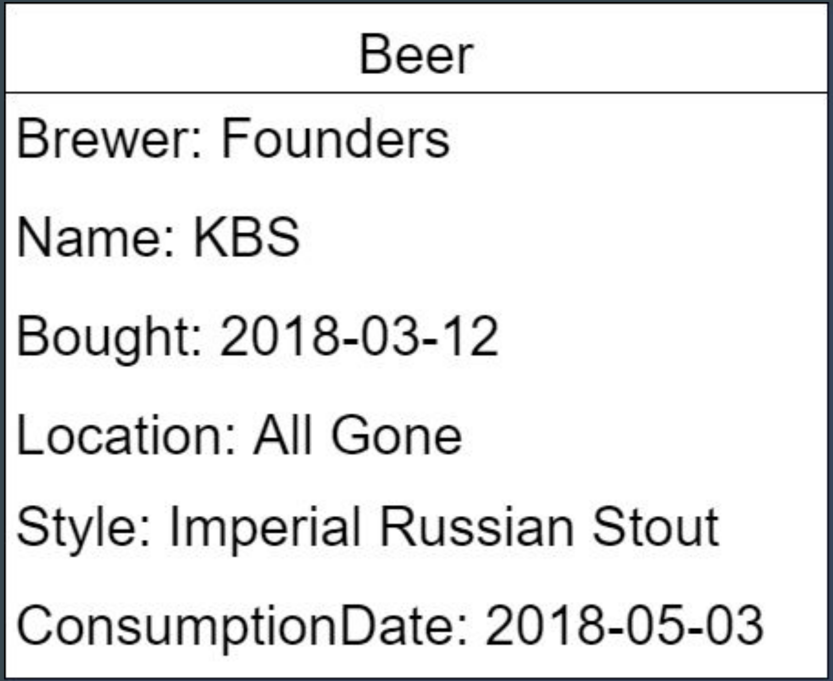
Name: KBS

Bought: 2018-03-12

Location: All Gone

Style: Imperial Russian Stout

We want to keep a history of everything we drank.



Beer

Brewer: Founders

Name: KBS

Bought: 2018-03-12

Location: All Gone

Style: Imperial Russian Stout

ConsumptionDate: 2018-05-03

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

But that’s only for new beers.

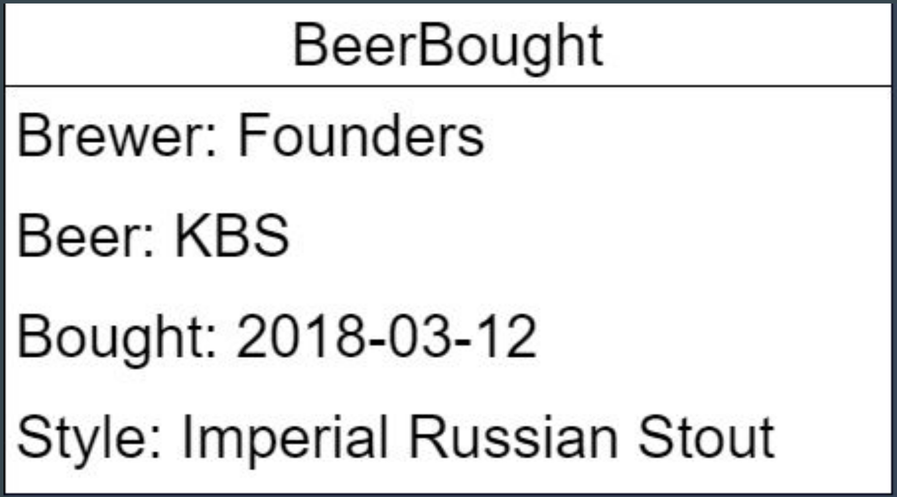
THAT'S NOT
GOOD ENOUGH

Events

BeerAddedToStorage
Brewer: Founders
Beer: KBS
Bought: 2018-03-12
Location: Fridge
Style: Imperial Russian Stout

Same Information as before + Explicit action about what happened

Make Small Events



BeerBought

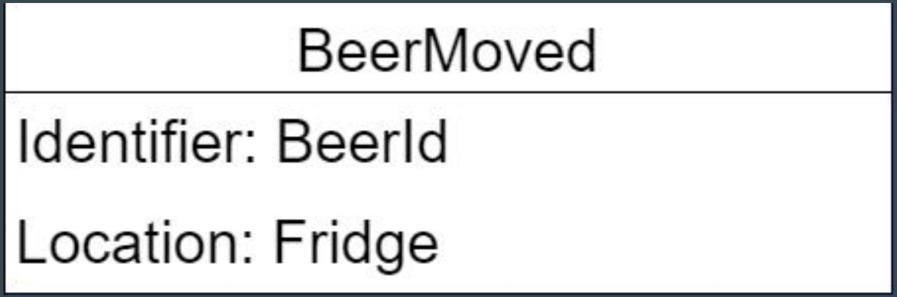
Brewer: Founders

Beer: KBS

Bought: 2018-03-12

Style: Imperial Russian Stout

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

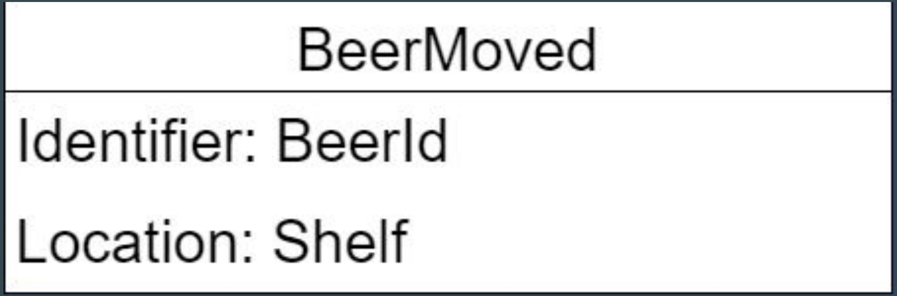


BeerMoved

Identifier: BeerId

Location: Fridge

When returning home I put the beer in my fridge

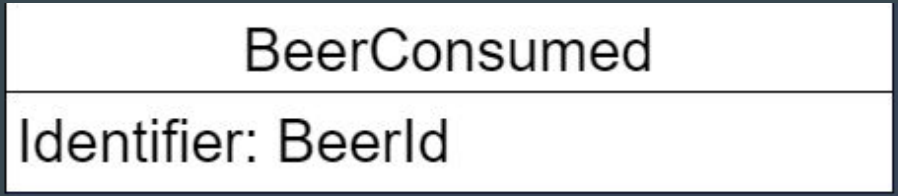


BeerMoved

Identifier: BeerId

Location: Shelf

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

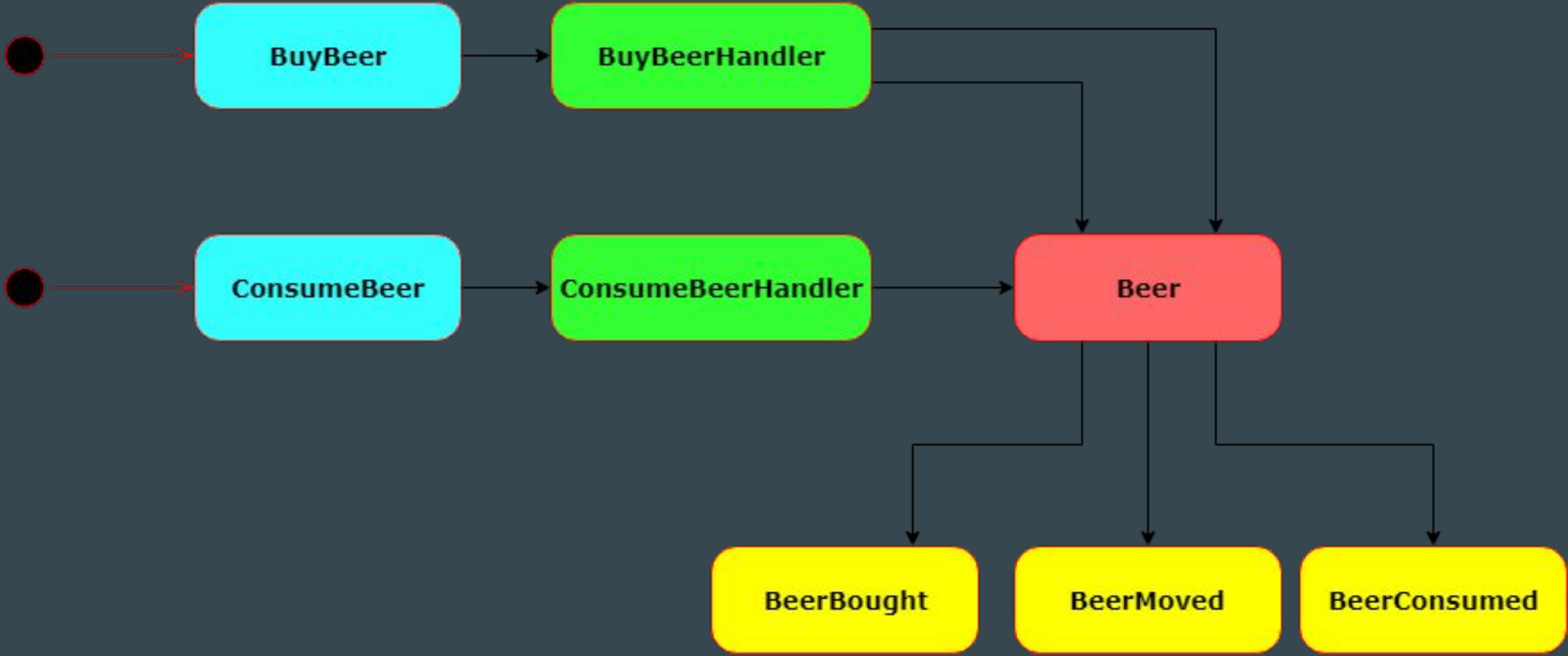
Event Sourcing in code

Prooph

http://getprooph.org/

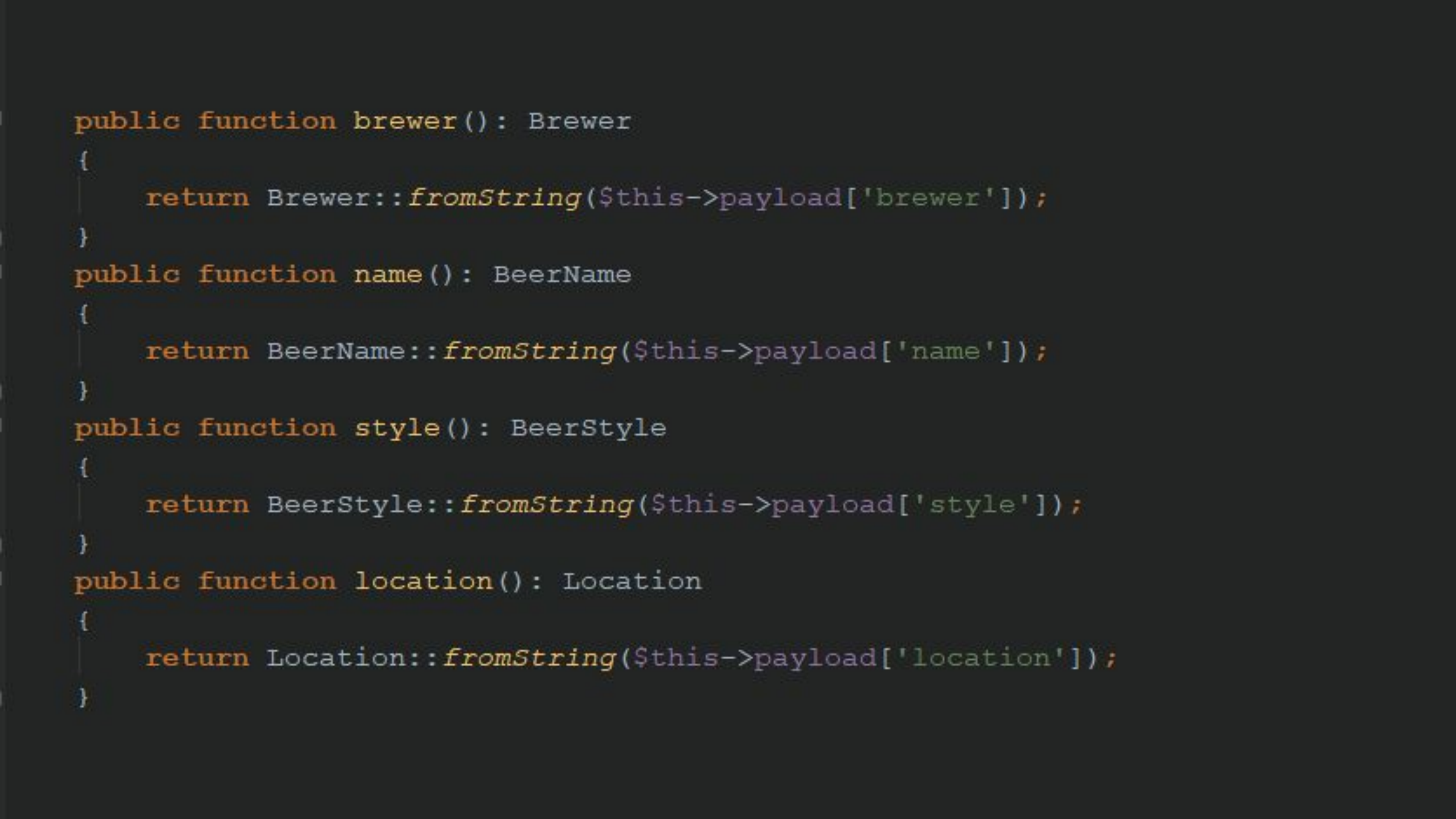
THE CQRS AND EVENT SOURCING COMPONENTS FOR PHP

Crafted for Your Enterprise App


BuyBeer
BuyBeerHandler
ConsumeBeer
ConsumeBeerHandler
Beer
BeerBought
BeerMoved
BeerConsumed

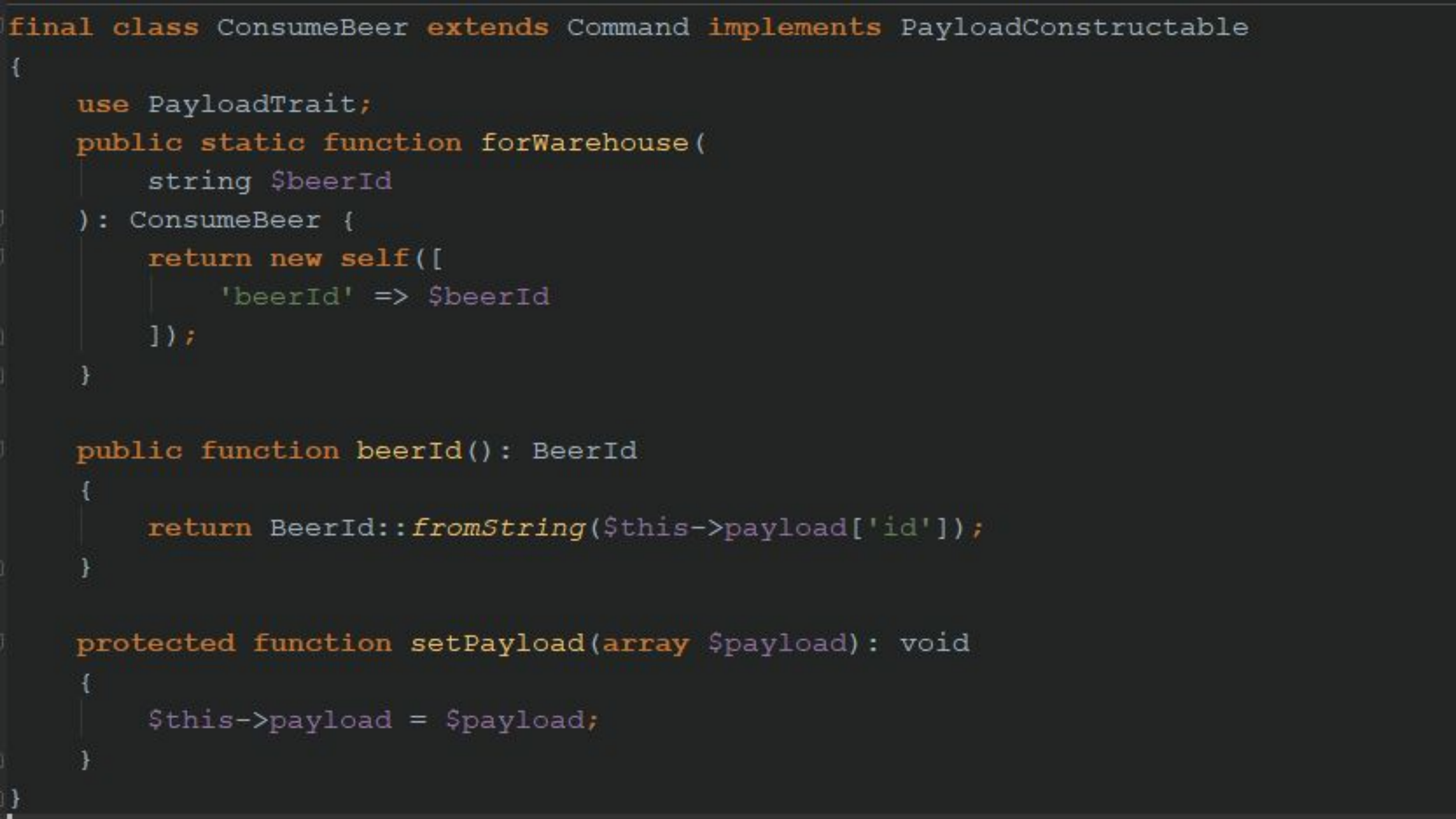
Command

```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
        ]);
    }
```



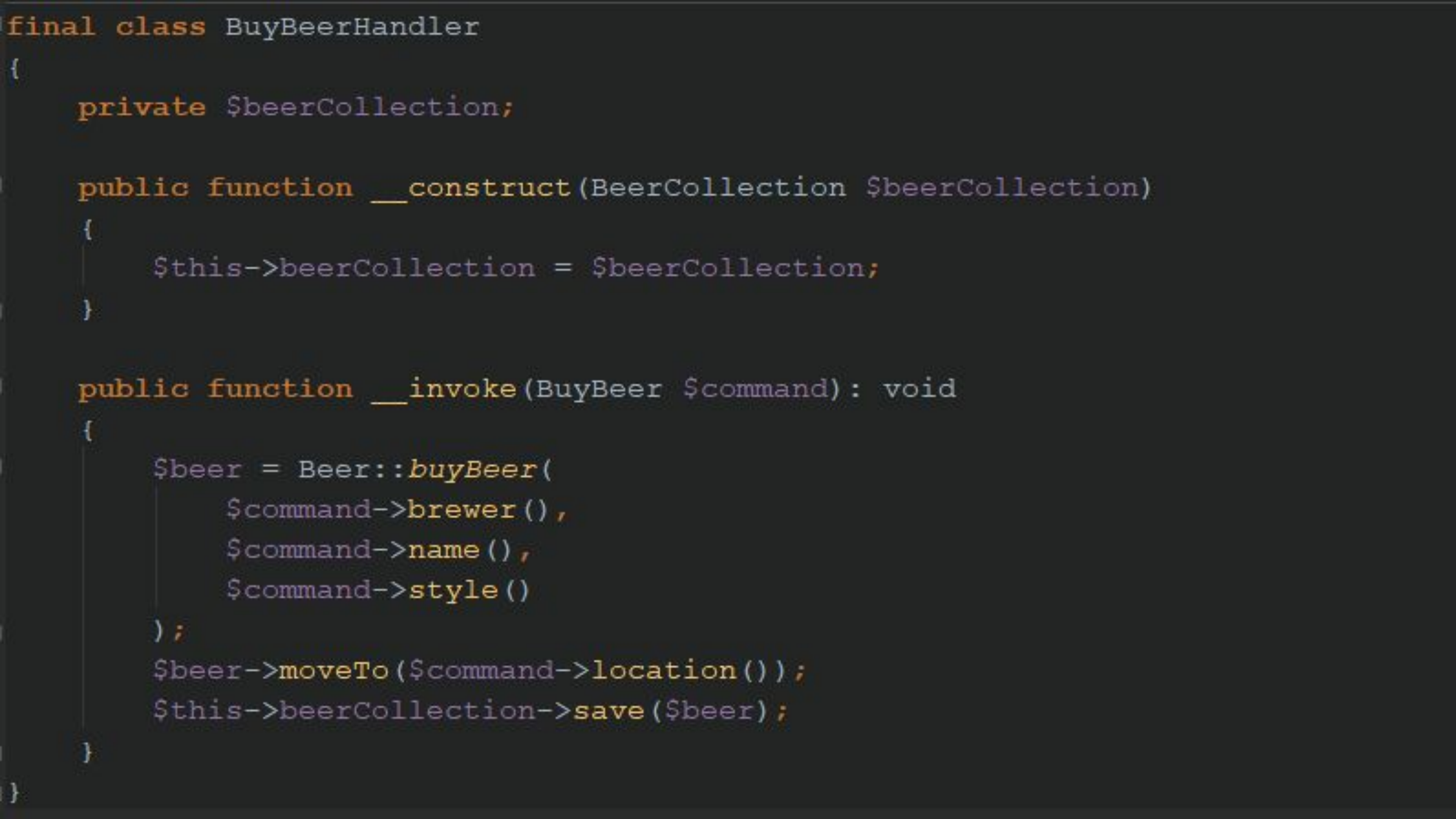
```php
public function brewer(): Brewer
{
    return Brewer::fromString($this->payload['brewer']);
}
public function name(): BeerName
{
    return BeerName::fromString($this->payload['name']);
}
public function style(): BeerStyle
{
    return BeerStyle::fromString($this->payload['style']);
}
public function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

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

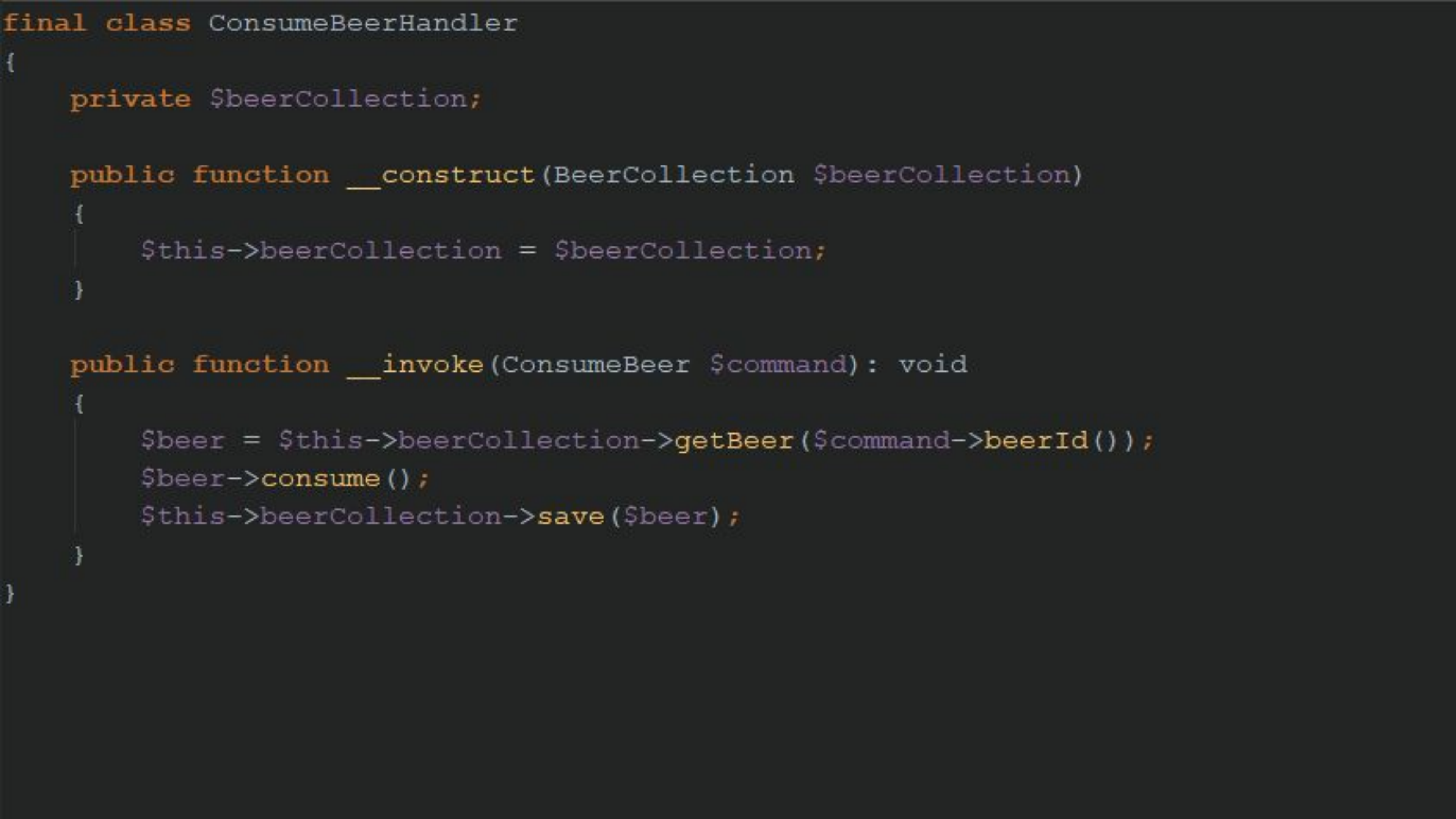


```php
final class ConsumeBeer extends Command implements PayloadConstructable
{
    use PayloadTrait;
    public static function forWarehouse(
        string $beerId
    ): ConsumeBeer {
        return new self([
            'beerId' => $beerId
        ]);
    }

    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);
    }
}
```



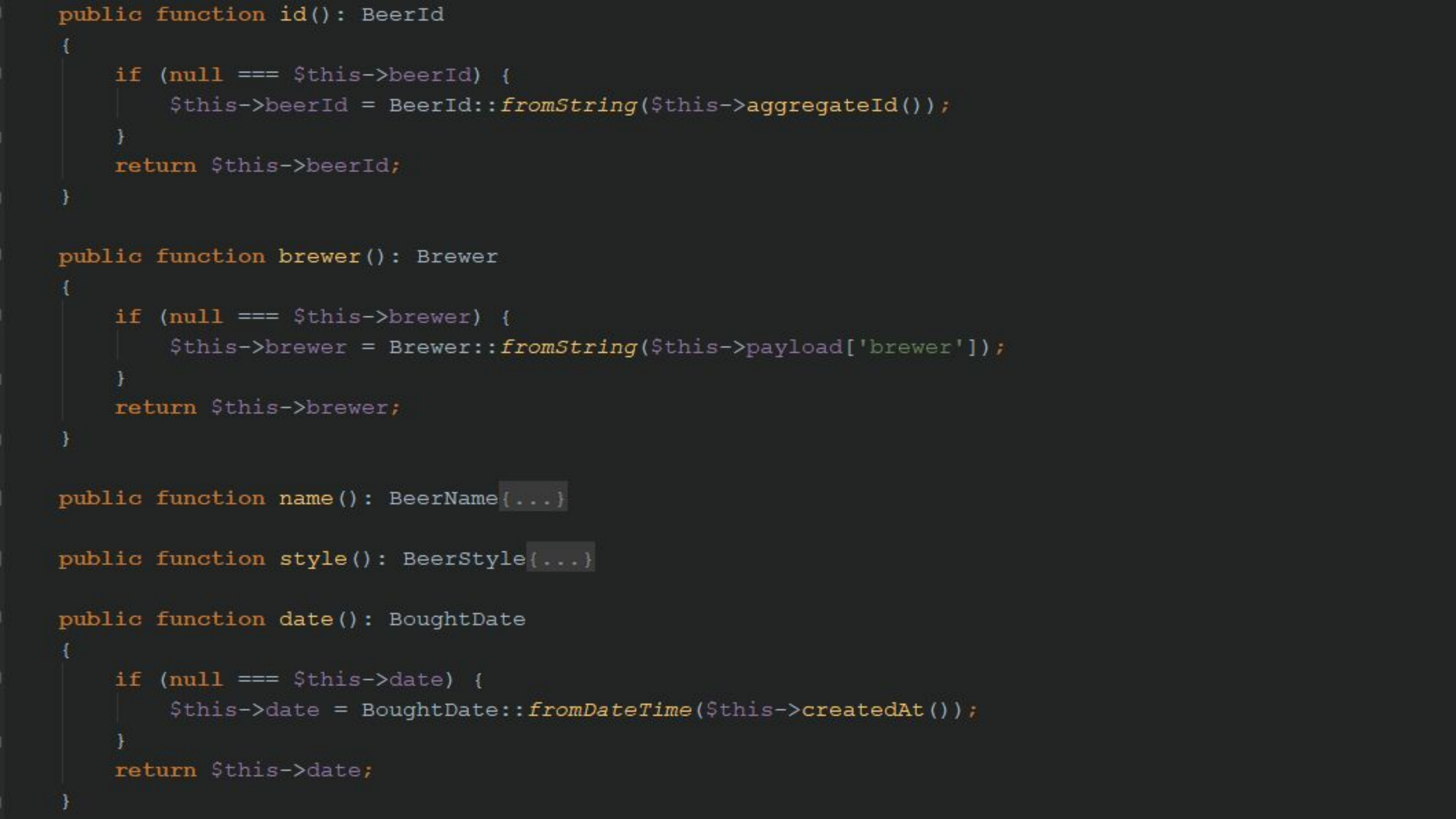
```php
final class ConsumeBeerHandler
{
    private $beerCollection;

    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

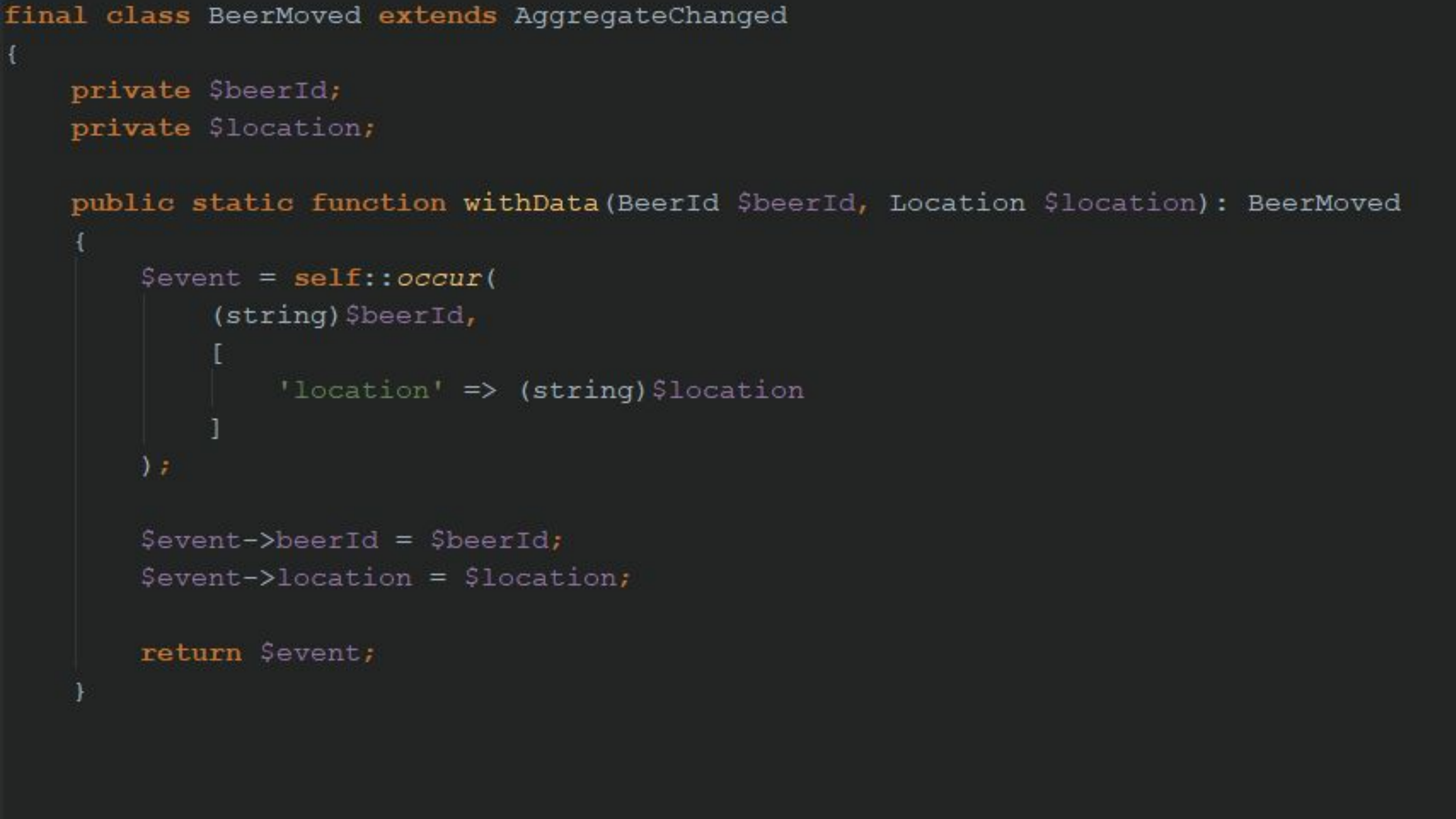
```php
public static function buyBeer(
    Brewer $brewer,
    BeerName $name,
    BeerStyle $style
): Beer {
    $self = new self();
    $beerId = BeerId::fromString((string)Uuid::uuid4());
    $self->recordThat(BeerBought::withData($beerId, $brewer, $name, $style));
    return $self;
}

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;
    }
```

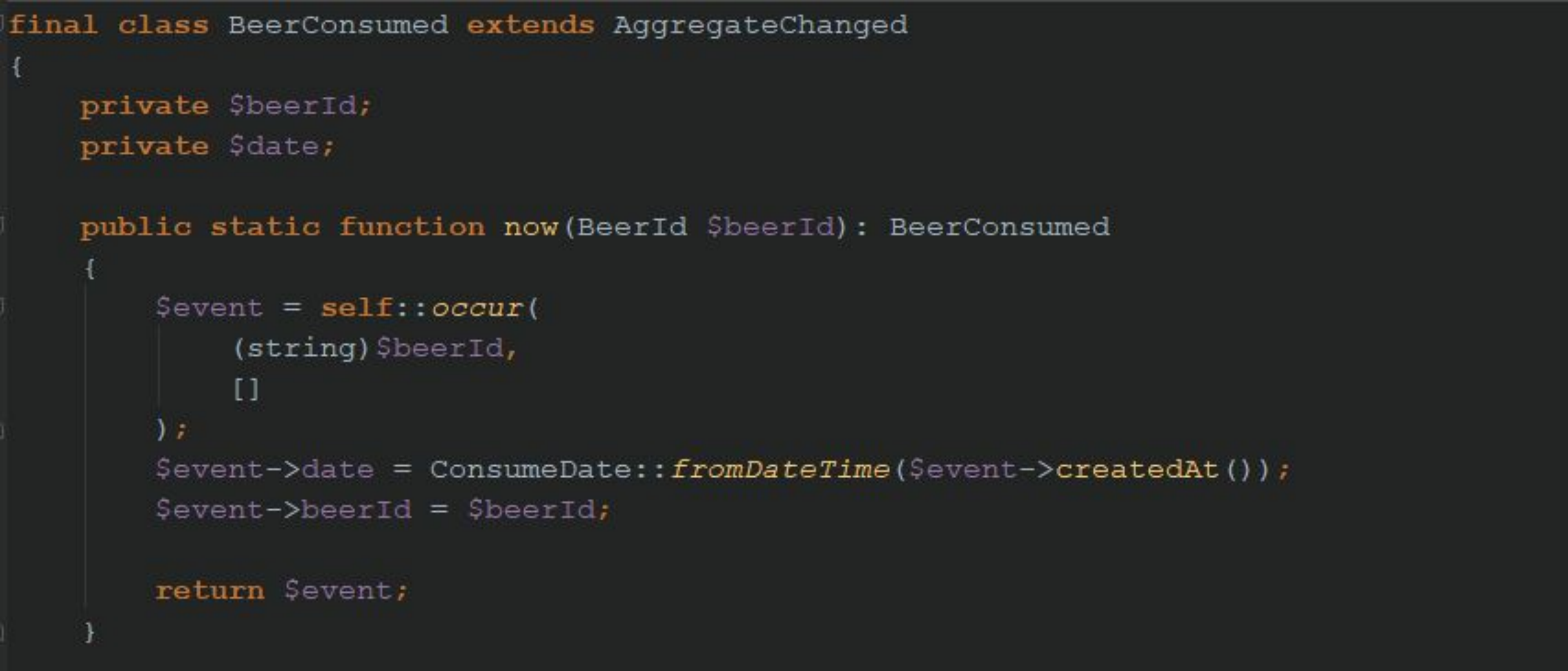


```php
public function id(): BeerId
{
    if (null === $this->beerId) {
        $this->beerId = BeerId::fromString($this->aggregateId());
    }
    return $this->beerId;
}

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;
}
```

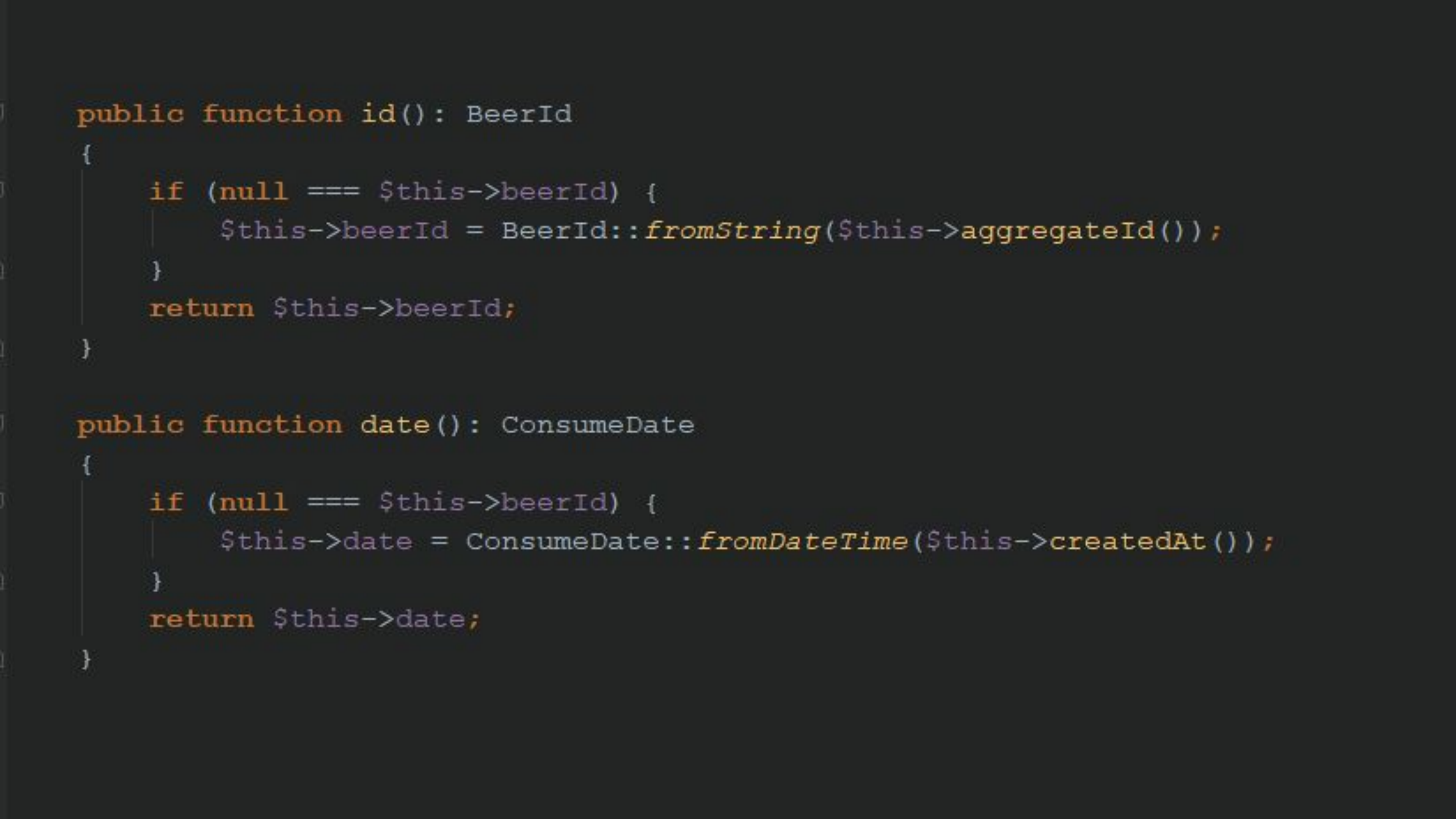


```php
final class BeerMoved extends AggregateChanged
{
    private $beerId;
    private $location;

    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;
}
```

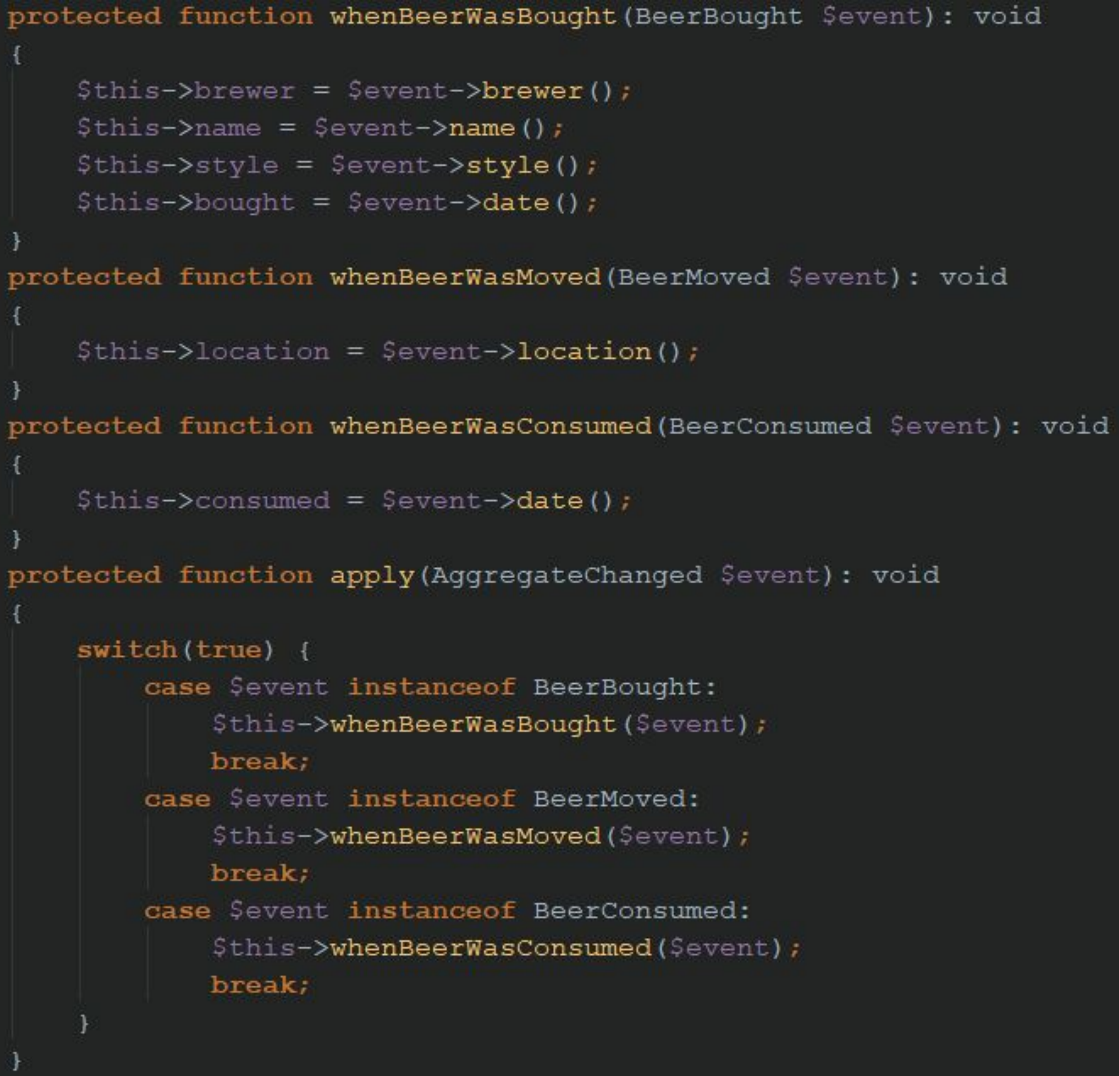


```php
final class BeerConsumed extends AggregateChanged
{
    private $beerId;
    private $date;

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

        return $event;
    }
```

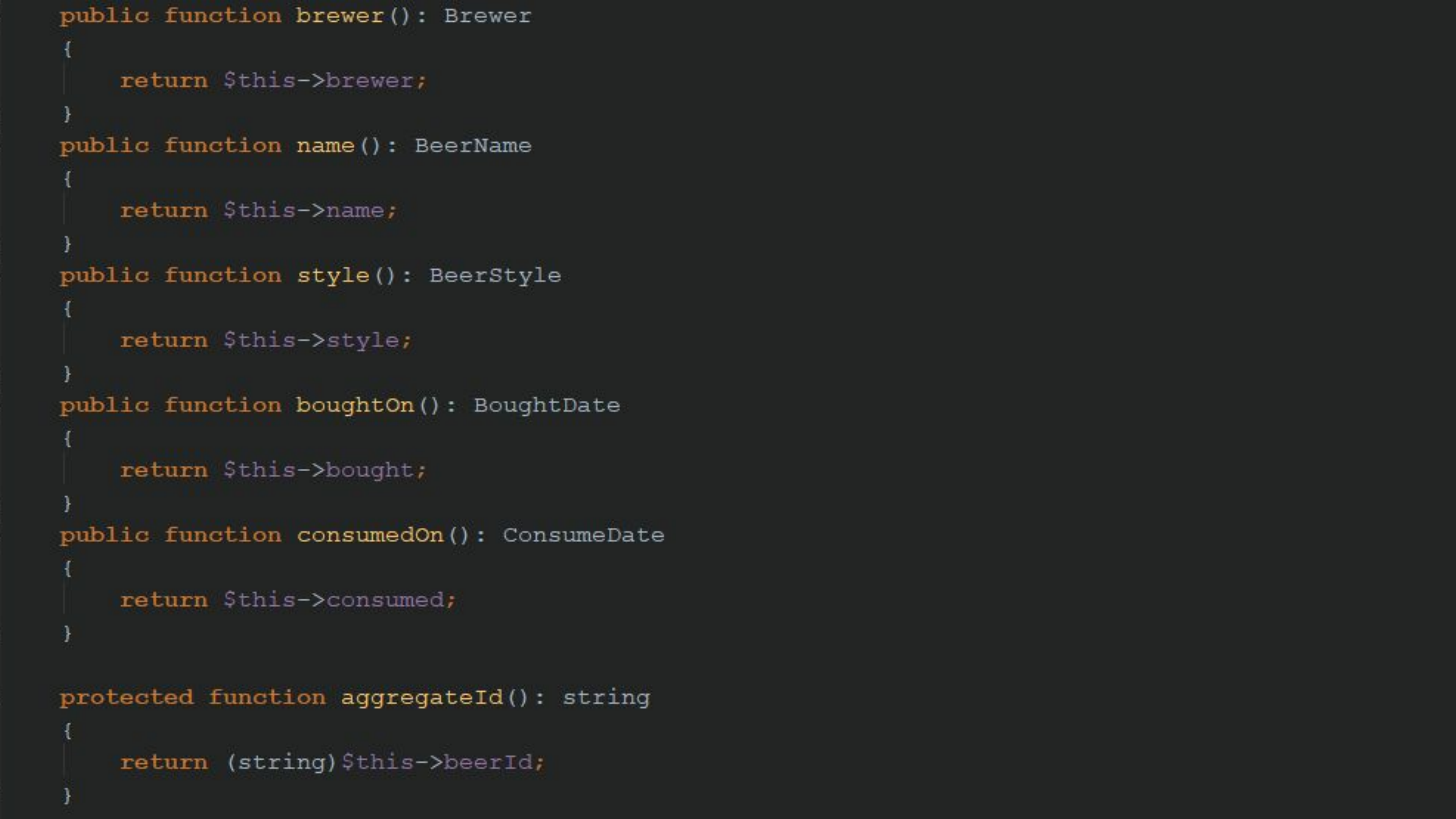


```php
public function id(): BeerId
{
    if (null === $this->beerId) {
        $this->beerId = BeerId::fromString($this->aggregateId());
    }
    return $this->beerId;
}

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

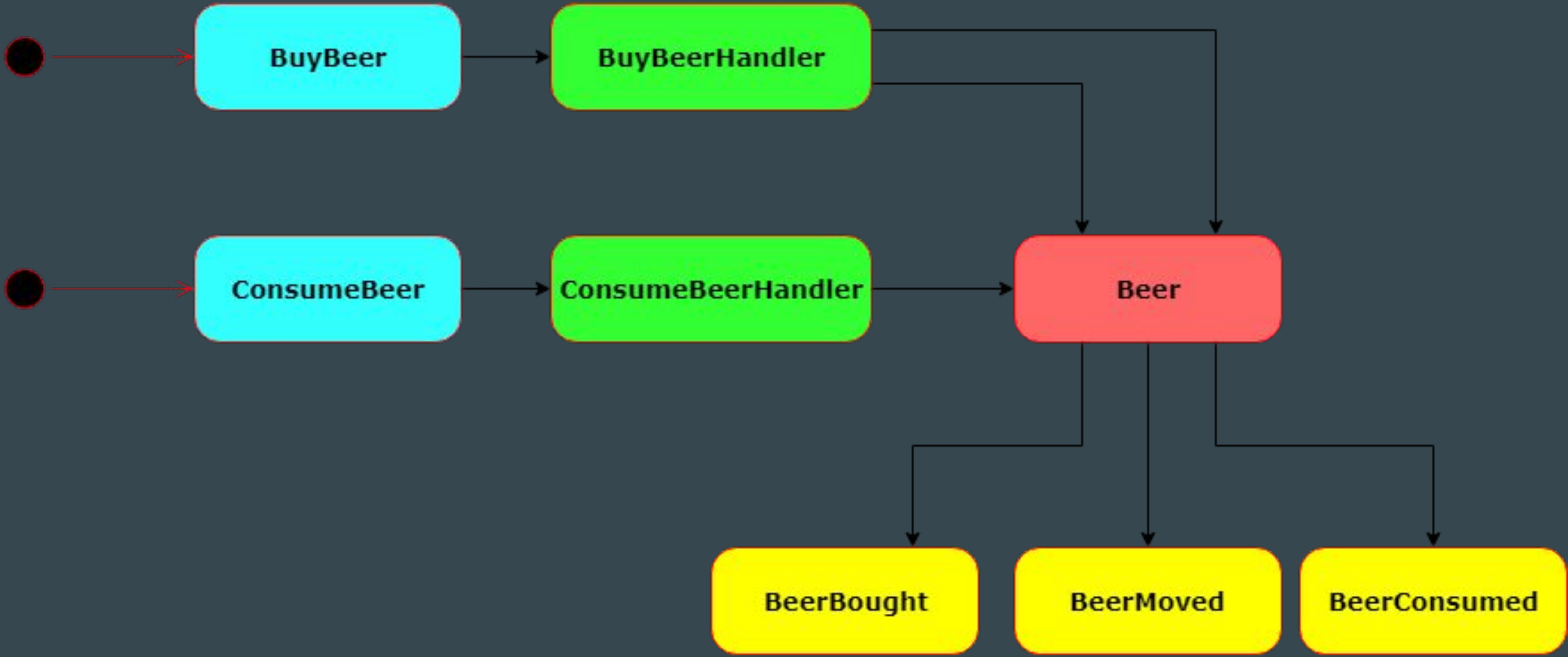
Back to the Aggregate



```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;
    }
}
```

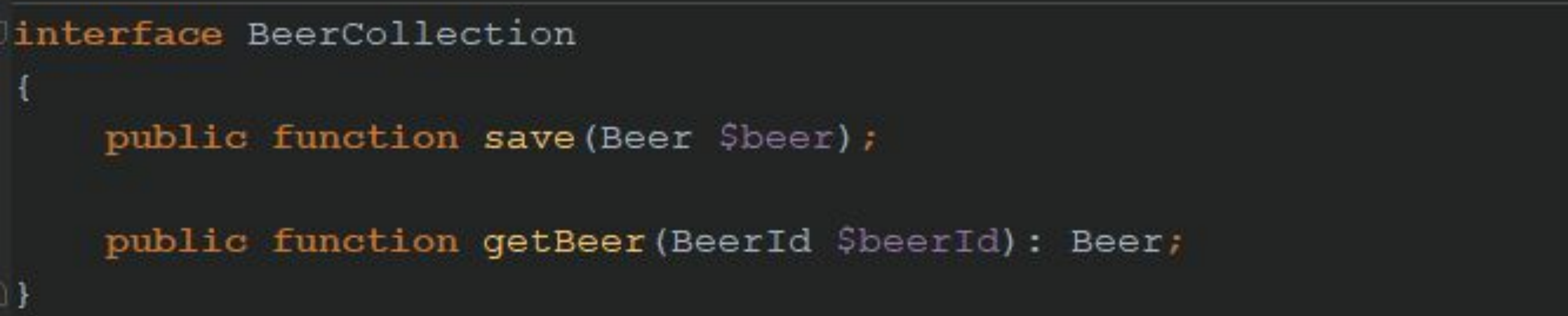


```php
public function brewer(): Brewer
{
    return $this->brewer;
}
public function name(): BeerName
{
    return $this->name;
}
public function style(): BeerStyle
{
    return $this->style;
}
public function boughtOn(): BoughtDate
{
    return $this->bought;
}
public function consumedOn(): ConsumeDate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

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


BuyBeer
BuyBeerHandler
ConsumeBeer
ConsumeBeerHandler
Beer
BeerBought
BeerMoved
BeerConsumed

GREAT SUCCESS!

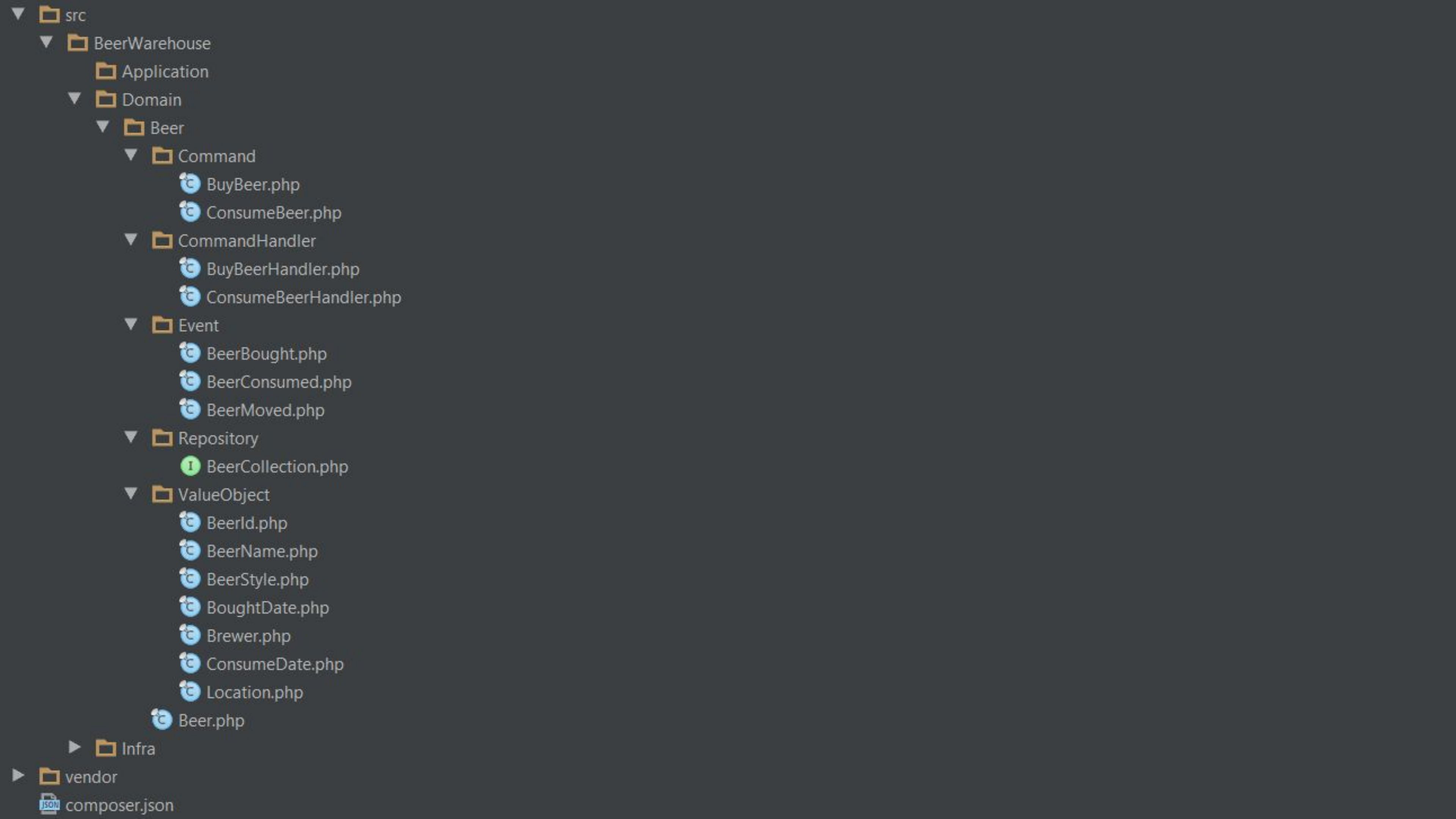
Think About Side Effects



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

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

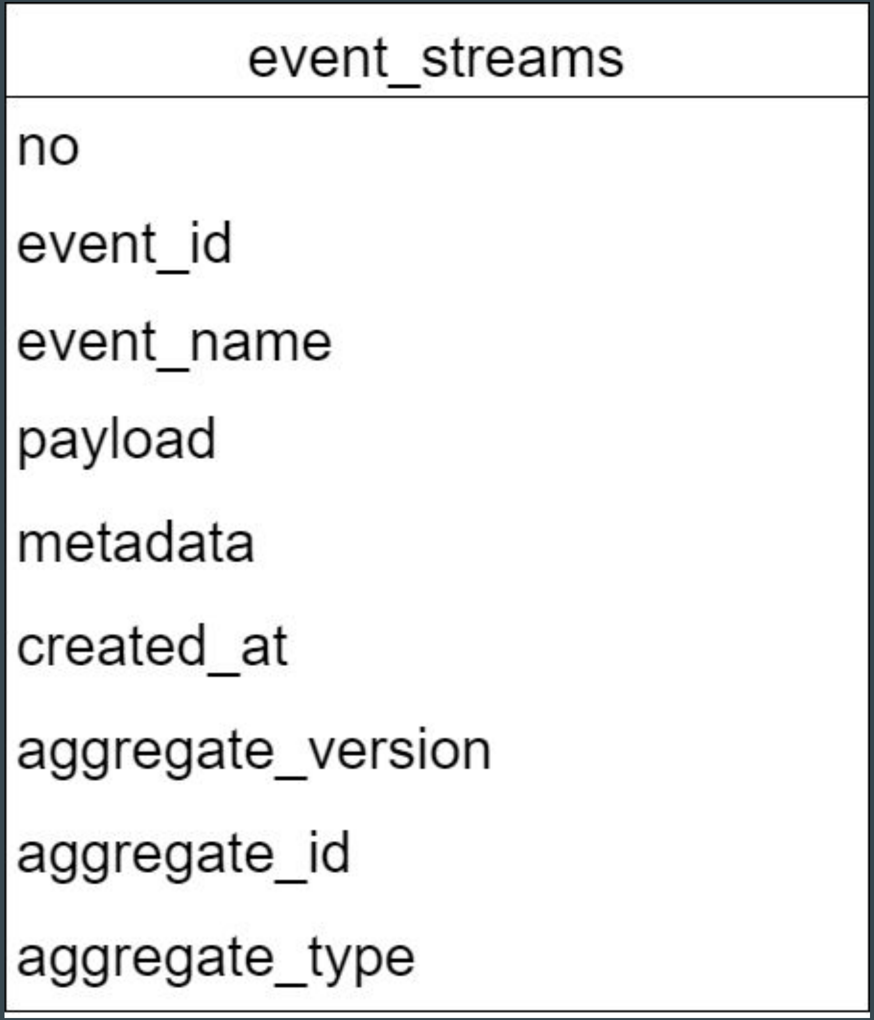
LIVE
RNC
2016
We are going to build a
great boarder wall!

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?

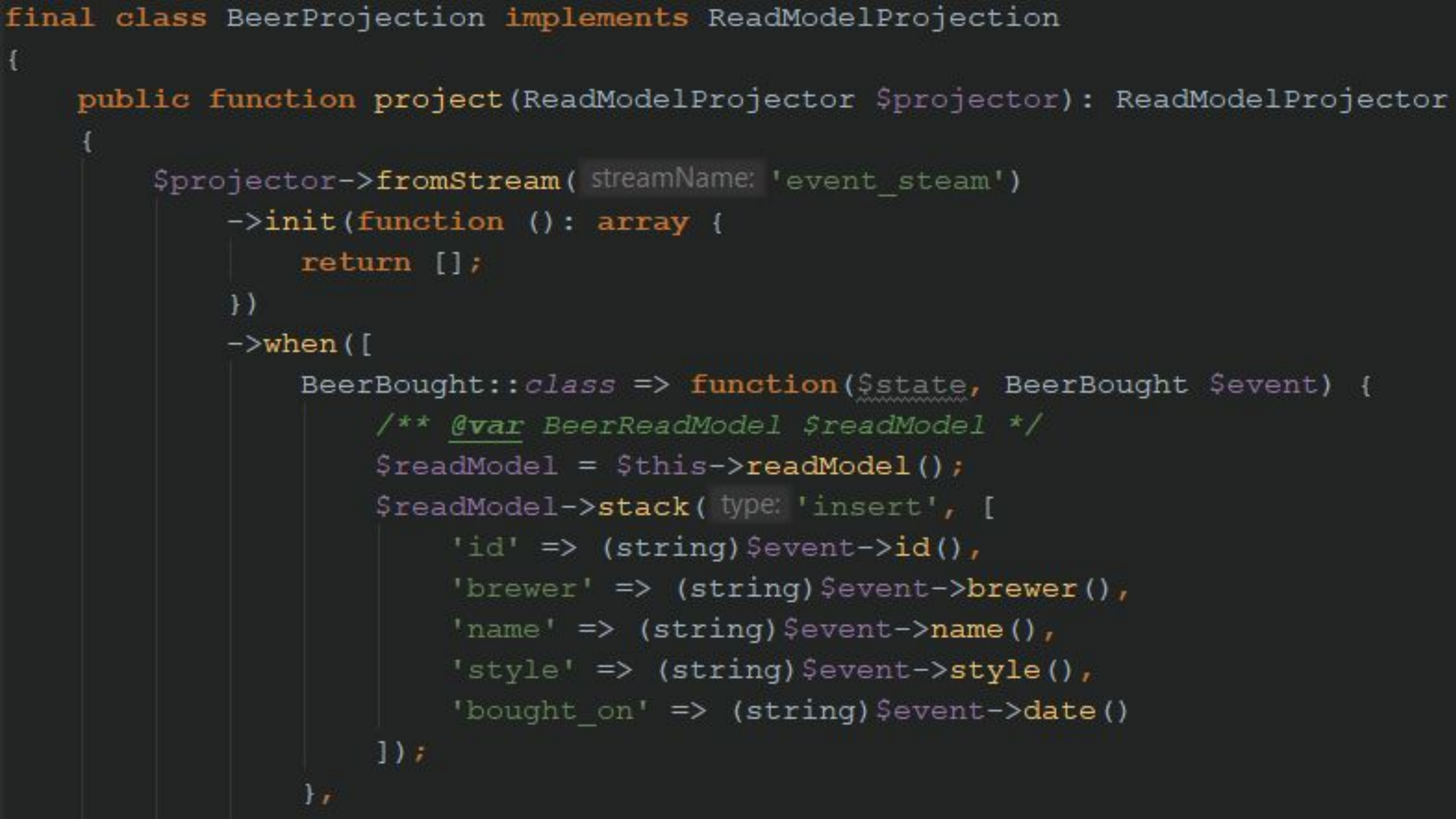
How many different styles do I have?

How many beers have I drank last 30 days?

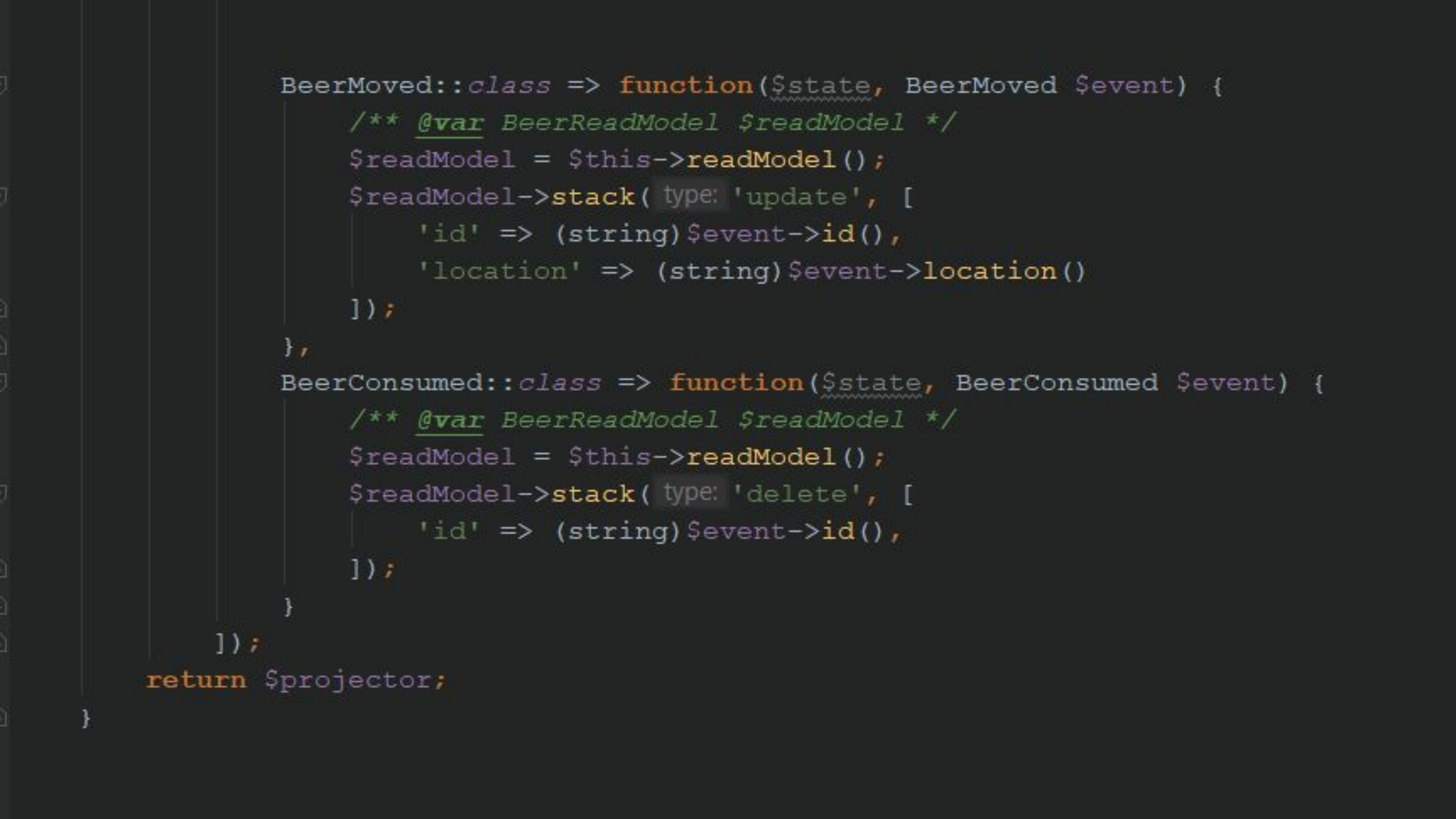
Projection

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()
                    ]);
                },
```



```
            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

Openi
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

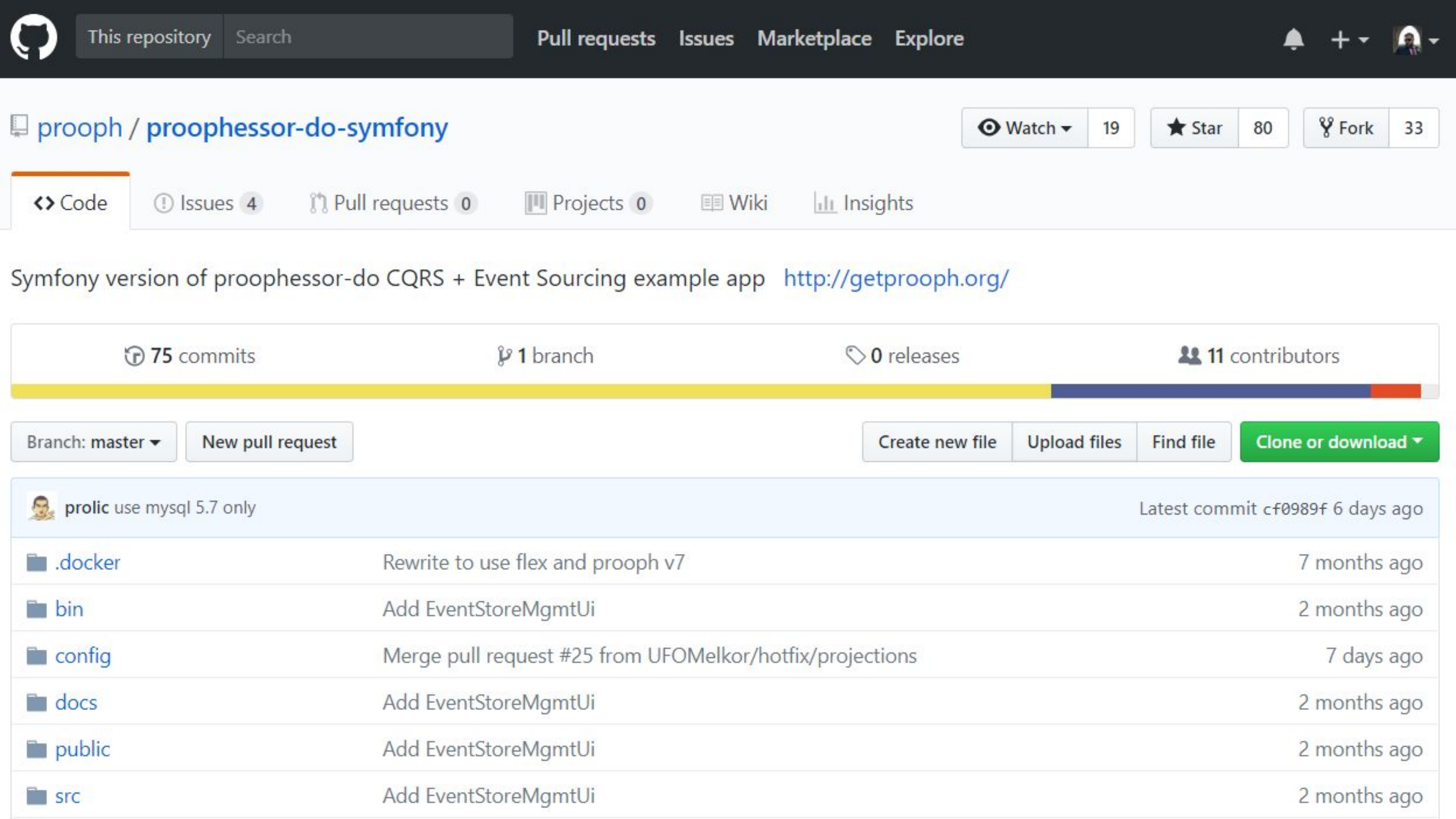
Most Of The Time Your DB Is Not Holy

What Now?

http://getprooph.org/

THE CQRS AND EVENT SOURCING COMPONENTS FOR PHP

Crafted for Your Enterprise App



prooph / proophessor-do-symfony

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

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

ESIDENT OF THE UNI

Thanks, Any Questions?

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

Smeerolie
TOKYO*
Verdeel & Heers

IN THE DARK
Caracole
Single-Wide
Nostradamus
Gerardus
JEVER

PAULANER
Oktoberfest Bier
6X BROUWERIJ DE MOLEN BIER
Founders
KBS
A FLAVORED STOUT