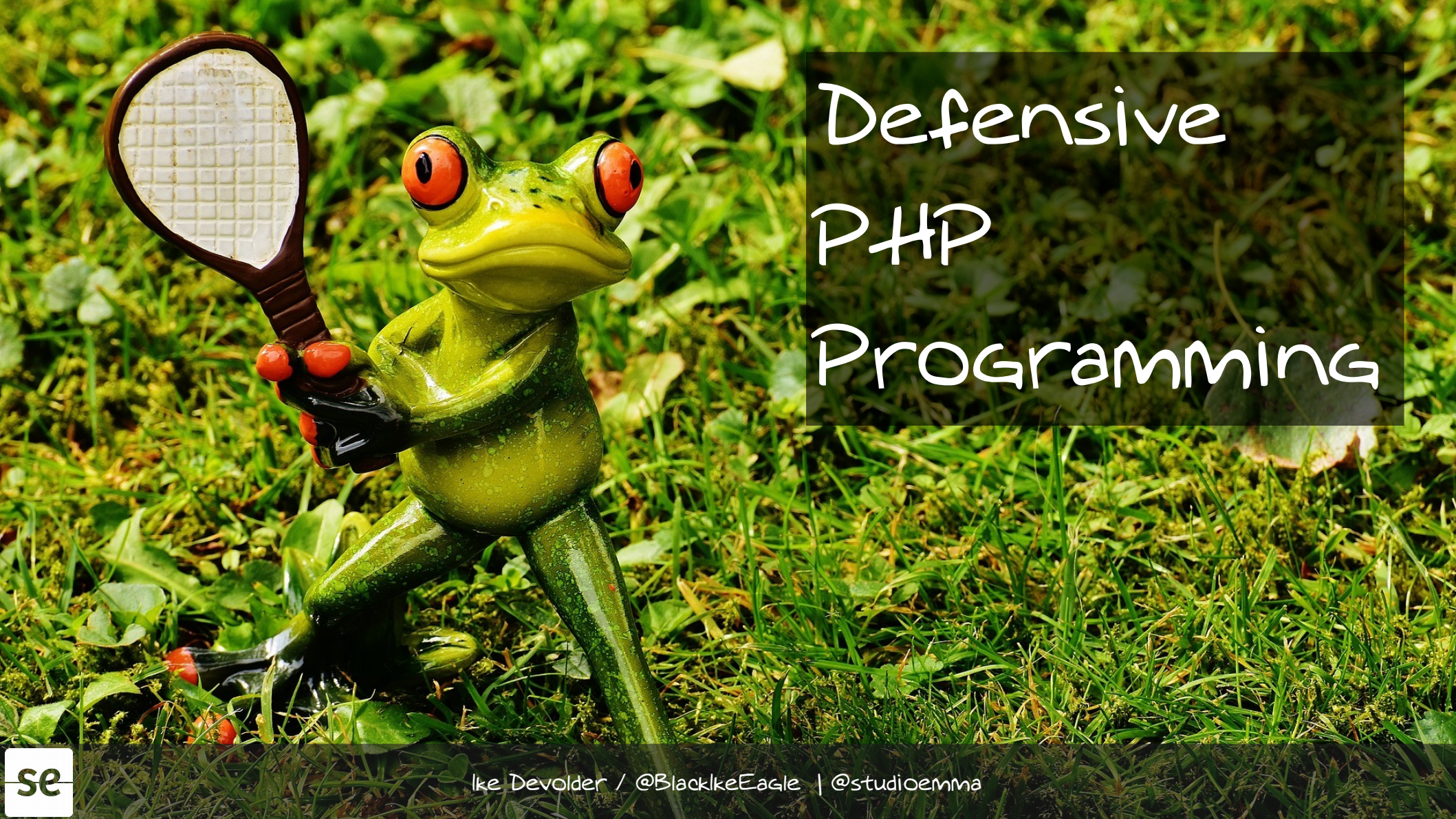

Defensive
PHP
Programming
Ike Devolder / @BlackIkeEagle | @studioemma

Disclaimer

Hi,

I'm Ike, Developer / Operations
at Studio Emma

studio emma

internet expertise

Magento®

Silver solution partner

PIMCORE®

Gold solution partner

Object Calisthenics

KATAs

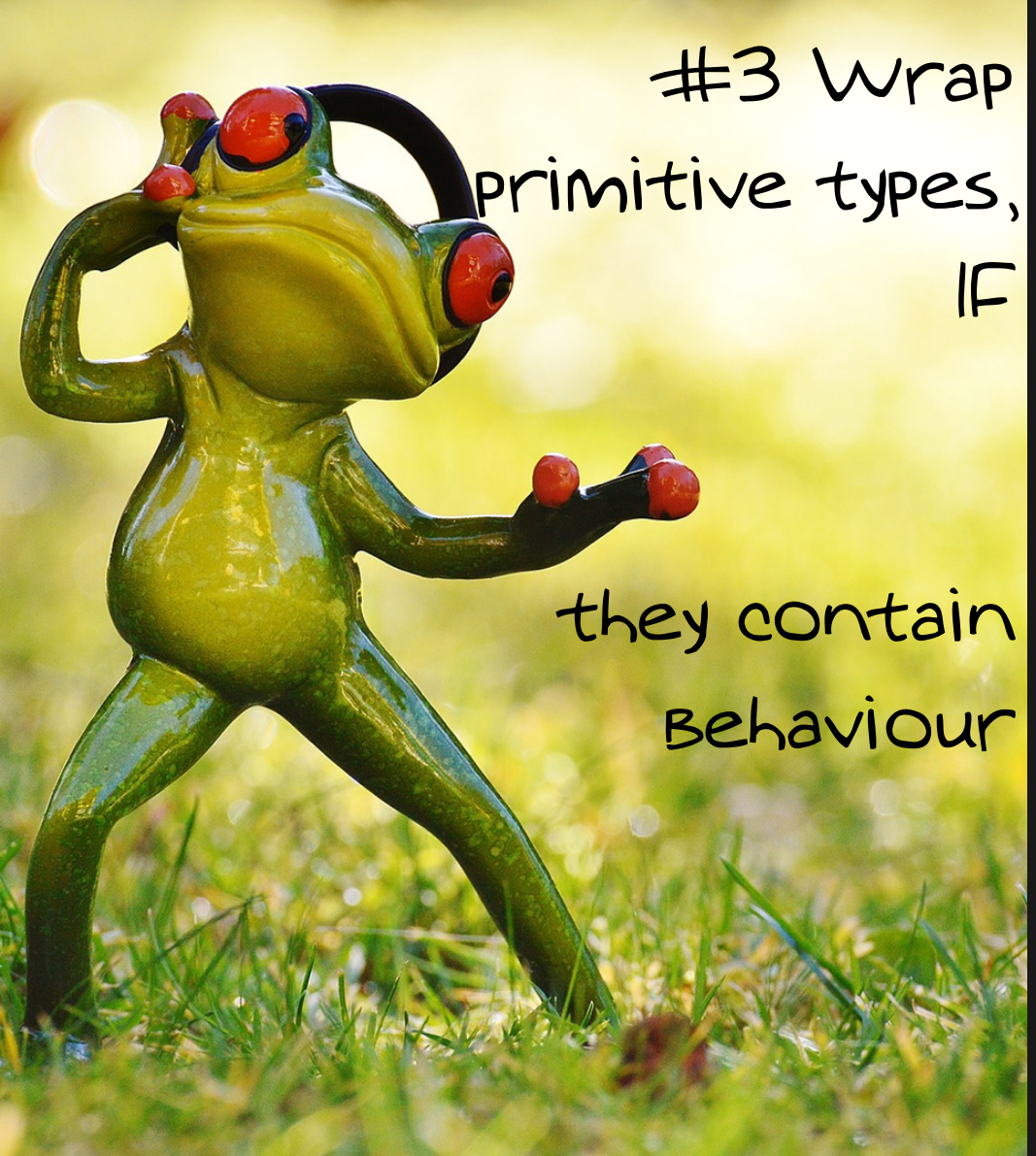
#1 One indentation level per method

```php
<?php

class IndentationLevel
{
    public function doSomething($array, $string)
    {
        foreach ($array as $key => &$value) {
            if (stripos($key, 'selector')) {
                if (!empty($value)) {
                    $value .= $string;
                } else {
                    $value = $string;
                }
            } else {
                if (!empty($value)) {
                    $value = $string . $value;
                } else {
                    $value = $string;
                }
            }
        }
        return $array;
    }
}
```

```php
<?php

class IndentationLevel
{
    public function doSomething($array, $string)
    {
        foreach ($array as $key => &$value) {
            $value = $this->updateValueByKey(
                $key,
                $value
            );
        }
        return $array;
    }

    private function updateValueByKey($key, $value, $string)
    {
        if (stripos($key, 'selector')) {
            return $this->updateSelectorValue($value, $string);
        } else {
            return $this->updateOtherValue($value, $string);
        }
    }

    private function updateSelectorValue($value, $string)
    {
        if (!empty($value)) {
            $value .= $string;
        } else {
            $value = $string;
        }
        return $value;
    }

    private function updateOtherValue($value, $string)
    {
        if (!empty($value)) {
            $value = $string . $value;
        } else {
            $value = $string;
        }
        return $value;
    }
}
```


```php
<?php

class AvoidElse
{
    public function doSomething($array, $string)
    {
        if (empty($array)) {
            $array[] = $string;
        } else {
            $array = [$string];
        }
    }
}
```

```php
<?php

class AvoidElse
{
    public function doSomething($array, $string)
    {
        if (empty($array)) {
            $array = [];
        }
        $array[] = $string;
    }
}
```




```php
<?php

class PrimitiveTypesBehaviour
{
    public function doSomething()
    {
        $component->repaint(true);
    }
}
```

```php
<?php

class PrimitiveTypesBehaviour
{
    public function doSomething()
    {
        $component->repaint( new Animate(true) );
    }
}
```


#4 only one
->
per line

```php
<?php

class Abbreviation
{
    private $mx = 1000;
    private $my = 1000;

    public function image($sx, $sy)
    {
        $ox = $sx;
        $oy = $sy;

        if ($sx > $this->mx) {
            $rt = $this->mx / $sx;
            $ox = $this->mx;
            $oy = $sy * $rt;
        } elseif ($sy > $this->my) {
            $rt = $this->my / $sy;
            $oy = $this->my;
            $ox = $ox * $rt;
        }

        return [$ox, $oy];
    }
}
```

```php
<?php

class Abbreviation
{
    private $maxWidth = 1000;
    private $maxHeight = 1000;

    public function image($sourceWidth, $sourceHeight)
    {
        $thumbnailWidth = $sourceWidth;
        $thumbnailHeight = $sourceHeight;

        if ($sourceWidth > $this->maxWidth) {
            $factor = $this->maxWidth / $sourceWidth;
            $thumbnailWidth = $this->maxWidth;
            $thumbnailHeight = $sourceHeight * $factor;
        } elseif ($sourceHeight > $this->maxHeight) {
            $factor = $this->maxHeight / $sourceHeight;
            $thumbnailHeight = $this->maxHeight;
            $thumbnailWidth = $sourceWidth * $factor;
        }

        return [$thumbnailWidth, $thumbnailHeight];
    }
}
```


#6 Keep your classes small

#7 Limit your instance variables

```php
<?php



class Customer
{
    public function __construct(
        $firstname,
        $lastname,
        $email,
        $street,
        $number,
        $postalcode,
        $city,
        $country
        // ...
    ) {
        // ... some code
    }
}
```

```php
<?php

class Game
{
    private $score = 0;

    public function getScore()
    {
        return $this->score;
    }

    public function setScore($score)
    {
        $this->score = $score;
    }
}

$game = new Game();
$game->setScore($game->getScore() + 1);
```

```php
<?php

class Game
{
    private $score = 0;

    public function currentScore()
    {
        return $this->score;
    }

    public function goal()
    {
        $this->score += 1;
    }
}

$game = new Game();
$game->goal();
```

#9 Document your code


Techniques
for safer
code


Fail early and
avoid deep nesting

```php
<?php

class FailEarly
{
    public function charsRemover(
        string $inputText,
        array $charsToRemove,
        int $length) :string
    {
        if (strlen($inputText) > 0) {
            if (count($charsToRemove) > 0) {
                if ($length > 0) {
                    return str_replace(
                        $charsToRemove,
                        '',
                        $inputText,
                        $length
                    );
                }
            }
        }

        return $inputText;
    }
}
```

```php
<?php

class FailEarly
{
    public function charsRemover(
        string $inputText,
        array $charsToRemove,
        int $length) :string
    {
        if (strlen($inputText) > 0) {
            if (count($charsToRemove) > 0) {
                if ($length > 0) {
                    return str_replace(
                        $charsToRemove,
                        '',
                        $inputText,
                        $length
                    );
                }
            }
        }

        return $inputText;
    }
}
```

```php
<?php

class FailEarly
{
    public function charsRemover(
        string $inputText,
        array $charsToRemove,
        int $length) :string
    {
        if (strlen($inputText) === 0) {
            return $inputText;
        }

        if (count($charsToRemove) === 0) {
            return $inputText;
        }

        if ($length <= 0) {
            return $inputText;
        }

        return str_replace(
            $charsToRemove,
            '',
            $inputText,
            $length
        );
    }
}
```


Don't have unexpected code paths

```php
<?php

class NoUnexpecedBehaviour
{
    public function changeStatus(
        Order $order,
        string $status) :void
    {
        switch ($status) {
        case 'placed':
            $order->confirm();
            break;
        case 'paymentRecieved':
            $order->paymentReceived();
            break;
        case 'shipped':
            $order->shipped();
            break;
        }
    }
}
```

```php
<?php

class NoUnexpecedBehaviour
{
    public function changeStatus(
        Order $order,
        string $status) :void
    {
        switch ($status) {
        case 'placed':
            $order->confirm();
            break;
        case 'paymentRecieved':
            $order->paymentReceived();
            break;
        case 'shipped':
            $order->shipped();
            break;
        }
    }
}
```

```php
<?php

class NoUnexpecedBehaviour
{
    public function changeStatus(
        Order $order,
        string $status) :void
    {
        switch ($status) {
        case 'placed':
            $order->confirm();
            break;
        case 'paymentRecieved':
            $order->paymentReceived();
            break;
        case 'shipped':
            $order->shipped();
            break;
        default:
            throw new UnknownOrderStatusException();
        }
    }
}
```

Revserse conditions

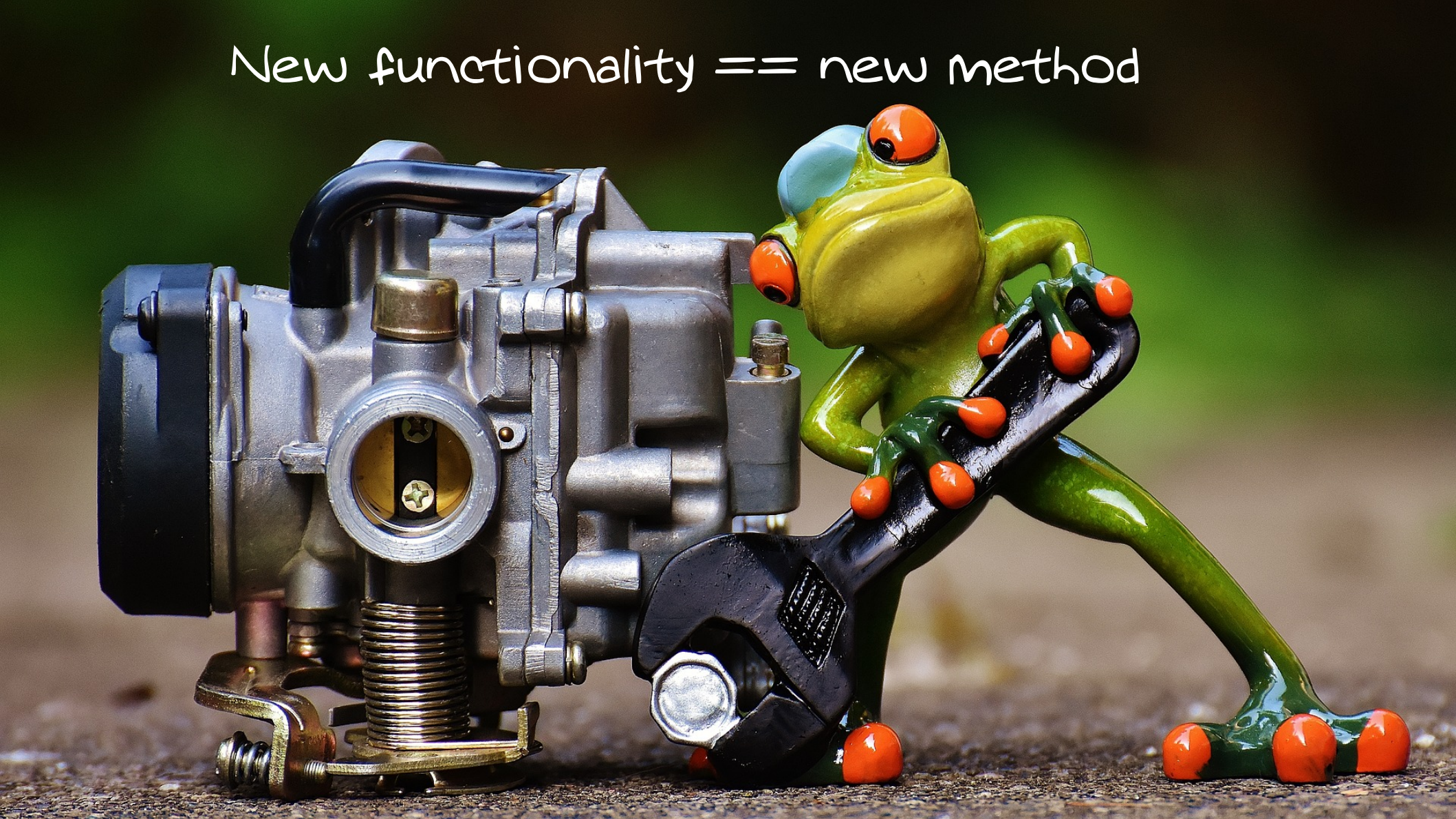
```php
<?php

class ReverseConditions
{
    public function condition(
        string $status,
        bool $readOnly,
        int $id) :bool
    {
        if ($status === 'invalid') {
            return false;
        }

        if ($readOnly === false) {
            return false;
        }

        if ($id >= 123) {
            return false;
        }

        if ($id === 122) {
            return false;
        }

        return true;
    }
}
```

```php
<?php

class ReverseConditions
{
    public function condition(
        string $status,
        bool $readOnly,
        int $id) :bool
    {
        if ($status === 'invalid') {
            return false;
        }

        if ($readOnly === false) {
            return false;
        }

        if ($id >= 123) {
            return false;
        }

        if ($id === 122) {
            return false;
        }

        return true;
    }
}
```

```php
<?php

class ReverseConditions
{
    public function condition(
        string $status,
        bool $readOnly,
        int $id) :bool
    {
        if ('invalid' === $status) {
            return false;
        }

        if (false === $readOnly) {
            return false;
        }

        if (123 <= $id) {
            return false;
        }

        if (122 === $id) {
            return false;
        }

        return true;
    }
}
```

```php
<?php

class ReverseConditions
{
    public function condition(
        string $status,
        bool $readOnly,
        int $id) :bool
    {
        if ('invalid' === $status) {
            return false;
        }

        if (false === $readOnly) {
            return false;
        }

        if (123 <= $id) {
            return false;
        }

        if (122 === $id) {
            return false;
        }

        return true;
    }
}
```

```php
<?php

class ReverseConditions
{
    public function condition(
        string $status,
        bool $readOnly,
        int $id) :bool
    {
        if ('invalid' === $status) {
            return false;
        }

        if (false === $readOnly) {
            return false;
        }

        if ($id >= 123) {
            return false;
        }

        if (122 === $id) {
            return false;
        }

        return true;
    }
}
```


New functionality == new method

```php
<?php

class AvoidControlParameters
{
    public function login(
        string $username,
        string $password,
        bool $freshlyRegistered) :bool
    {
        // ... some code
    }
}
```

```php
<?php

class AvoidControlParameters
{
    public function login(
        string $username,
        string $password,
        bool $freshlyRegistered) :bool
    {
        // ... some code
    }
}
```

```php
<?php

class AvoidControlParameters
{
    public function login(
        string $username,
        string $password) :bool
    {
        // ... some code
    }

    public function loginAsFreshlyRegistered(
        string $username,
        string $password) :bool
    {
        // ... some code
    }
}
```

```php
<?php

class AvoidParameterCreep
{
    public function getListForUser(int $userId)
    {
        $query = "SELECT * FROM `test`";

        // some extra code

        return $result;
    }
}
```

```php
<?php

class AvoidParameterCreep
{
    public function getListForUser(
        int $userId,
        string $type = 'default')
    {
        $query = "SELECT * FROM `test`";

        switch ($type) {
        case 'freshTokens':
            // some magic additions to $query
            break;
        case 'invalidTokens':
            // some other magic additions to $query
            break;
        default:
            // keep original behaviour
            break;
        }

        // some extra code

        return $result;
    }
}
```

```php
<?php

class AvoidParameterCreep
{
    public function getListForUser(
        int $userId,
        string $type = 'default')
    {
        $query = "SELECT * FROM `test`";

        switch ($type) {
        case 'freshTokens':
            // some magic additions to $query
            break;
        case 'invalidTokens':
            // some other magic additions to $query
            break;
        default:
            // keep original behaviour
            break;
        }

        // some extra code

        return $result;
    }
}
```

```php
<?php

class AvoidParameterCreep
{
    private function getFreshTokensForUser(
        int $userId)
    {
    }

    private function getInvalidTokensForUser(
        int $userId)
    {
    }

    private function getUsableTokensForUser(
        int $userId)
    {
    }

    public function getListForUser(
        int $userId,
        string $type = 'default')
    {
        switch ($type) {
        case 'freshTokens':
            return $this->getFreshTokensForUser(
                $userId
            );
            break;
        case 'invalidTokens':
            return $this->getInvalidTokensForUser(
                $userId
            );
            break;
        default:
            return $this->getUsableTokensForUser(
                $userId
```

```php
<?php

class AvoidParameterCreep
{
    public function getListForUser(
        int $userId,
        string $type = 'default')
    {
        $query = "SELECT * FROM `test`";

        switch ($type) {
        case 'freshTokens':
            // some magic additions to $query
            break;
        case 'invalidTokens':
            // some other magic additions to $query
            break;
        default:
            // keep original behaviour
            break;
        }

        // some extra code

        return $result;
    }
}
```

```php
<?php

class AvoidParameterCreep
{
    public function getFreshTokensForUser(
        int $userId)
    {
    }

    public function getInvalidTokensForUser(
        int $userId)
    {
    }

    public function getUsableTokensForUser(
        int $userId)
    {
    }
}
```


TELEPHON
Avoid optional
dependencies

```php
<?php

class AvoidOptionalDependencies
{
    const GUEST = 1;
    const VISITOR = 2;
    const ADMIN = 3;

    private $user = null;
    private $logger = null;

    public function __construct(
        UserInterface $user,
        Logger $logger = null)
    {
        // initialize
    }

    public function checkAcl()
    {
        if (self::GUEST === $user->acl()) {
            if (! empty($this->logger)) {
                $this->logger->log(/*...*/);
            }
        }
        // some other code
    }
}
```

```php
<?php

class AvoidOptionalDependencies
{
    const GUEST = 1;
    const VISITOR = 2;
    const ADMIN = 3;

    private $user = null;
    private $logger = null;

    public function __construct(
        UserInterface $user,
        Logger $logger = null)
    {
        // initialize
    }

    public function checkAcl()
    {
        if (self::GUEST === $user->acl()) {
            if (! empty($this->logger)) {
                $this->logger->log(/*...*/);
            }
        }
        // some other code
    }
}
```

```php
<?php

class AvoidOptionalDependencies
{
    const GUEST = 1;
    const VISITOR = 2;
    const ADMIN = 3;

    private $user = null;
    private $logger = null;

    public function __construct(
        UserInterface $user,
        LoggerInterface $logger)
    {
        // initialize
    }

    public function checkAcl()
    {
        if (self::GUEST === $user->acl()) {
            $this->logger->log(/*...*/);
        }
        // some other code
    }
}
```


Avoid mixed return
types

```php
<?php

class AvoidMixedReturnTypes
{
    public function frog($id)
    {
        $result = $this->repository('frog')
            ->id($id);

        if (empty($result)) {
            return false;
        }

        return new Frog($result->name());
    }
}
```

```php
<?php

class AvoidMixedReturnTypes
{
    public function frog($id)
    {
        $result = $this->repository('frog')
            ->id($id);

        if (empty($result)) {
            return false;
        }

        return new Frog($result->name());
    }
}
```

```php
<?php

class AvoidMixedReturnTypes
{
    public function frog($id)
    {
        $result = $this->repository('frog')
            ->id($id);

        if (empty($result)) {
            return new NoFrog();
        }

        return new Frog($result->name());
    }
}
```

```php
<?php

class AvoidMixedReturnTypes
{
    public function frog($id)
    {
        $result = $this->repository('frog')
            ->id($id);

        if (empty($result)) {
            return false;
        }

        return new Frog($result->name());
    }
}
```

```php
<?php

class AvoidMixedReturnTypes
{
    public function frog($id)
    {
        $result = $this->repository('frog')
            ->id($id);

        if (empty($result)) {
            throw new NoFrogFoundException();
        }

        return new Frog($result->name());
    }
}
```

Value OBjects

```php
<?php

class ValueObjects
{
    /**
     * @param mixed $status
     *   int 1 order placed
     *   int 2 payment received
     *   bool true order shipped
     *   null invalid order
     */
    public function changeStatus($status)
    {
        /* ... some code ... */
    }
}
```

```php
<?php

class ValueObjects
{
    /**
     * @param mixed $status
     *   int 1 order placed
     *   int 2 payment received
     *   bool true order shipped
     *   null invalid order
     */
    public function changeStatus($status)
    {
        /* ... some code ... */
    }
}
```

```php
<?php

class ValueObjects
{
    public function changeStatus(Status $status)
    {
        /* ... some code ... */
    }
}

class Status
{
    const ORDER_PLACED = 1;
    const PAYMENT_OK = 2;
    const SHIPPED = true;
    const INVALID = null;

    public function __construct($status)
    {
        $this->validateStatus($status);
        $this->status = $status;
    }

    private function validateStatus($status)
    {
        if (! $valid) {
            throw new \InvalidArgumentException(
                'Invalid status given'
            );
        }
    }
}
```


Immutability

```php
<?php

class Immutable
{
    private $updateTime;

    public function updateTime(\DateTime $date)
    {
        $this->updateTime = $date;
    }
}

$now = new \DateTime('now');
$immutable = new Immutable();
$immutable->updateTime($now);
/* ... more code ... */
sleep(15);
$now->setTimestamp(time());
```

```php
<?php

class Immutable
{
    private $updateTime;

    public function updateTime(\DateTime $date)
    {
        $this->updateTime = $date;
    }
}

$now = new \DateTime('now');
$immutable = new Immutable();
$immutable->updateTime($now);
/* ... more code ... */
sleep(15);
$now->setTimestamp(time());
```

```php
<?php

class Immutable
{
    private $updateTime;

    public function updateTime(
        \DateTimeInterface $date)
    {
        $this->updateTime = $date;
    }
}

$now = new \DateTimeImmutable('now');
$immutable = new Immutable();
$immutable->updateTime($now);
/* ... more code ... */
sleep(15);
$now = $now->setTimestamp(time());
```

Interfaces & Exceptions

Add logging

```php
<?php

class ProcessService
{
    public function process()
    {
        if ($orderIsIncomplete) {
            throw new IncompleteOrderException();
        }

        if ($paymentIsPending) {
            throw new PaymentPendingException();
        }

        /* ... process things */
    }
}
```

```php
<?php

class OrderProcessController
{
    public function processAction(
        $request,
        $response)
    {
        $input = $request->input();

        $processor = new ProcessService();

        try {
            $processor->process();
        } catch (PaymentPendingException $e) {
            \Logger::info(
                'payment is still pending',
                $context
            );
            $response->status(302)
                ->action('payment-pending');
        } catch (\Throwable $t) {
            \Logger::error(
                'something unexpected happend',
                $context
            );
            $response->status(500)
                ->action('error');
        }
        return $response;
    }
}
```


Threats
STOP
Polizei


Input
validation
VOL
OFF

Prepared statements

```php
<?php

class PreparedStatements
{
    public function login($user, $pass)
    {
        $query = 'SELECT * FROM `user`'
            . ' WHERE'
            . " `user` = '" . $user . "'"
            . ' AND'
            . " `password` = '" . $pass . "'";

        $result = $this->db->query($query);
        /* ... further processing ... */
    }
}
```

```php
<?php

class PreparedStatements
{
    public function login($user, $pass)
    {
        $query = 'SELECT * FROM `user`'
            . ' WHERE'
            . " `user` = '" . $user . "'"
            . ' AND'
            . " `password` = '" . $pass . "'";

        $result = $this->db->query($query);
        /* ... further processing ... */
    }
}
```

```php
<?php

class PreparedStatements
{
    public function login($user, $pass)
    {
        $query = 'SELECT * FROM `user`'
            . ' WHERE'
            . ' `user` = ?'
            . ' AND'
            . ' `password` = ?';

        $statement = $this->db->prepare($query);
        $result = $statement->execute(
            [
                $user,
                $pass,
            ]
        );
        /* ... further processing ... */
    }
}
```


Output escape


Done
Ike Devolder / @BlackIkeEagle | @studioemma

Questions?

Thanks https://joind.in/talk/f70df

I'm Ike, Developer / Operations
at Studio Emma

- @BlackIkeEagle
- PHP-WVL
- DockerWest
- Parchive
- BlackIkeEagle
- Archlinux TU
- VdeBug
- herecura.eu