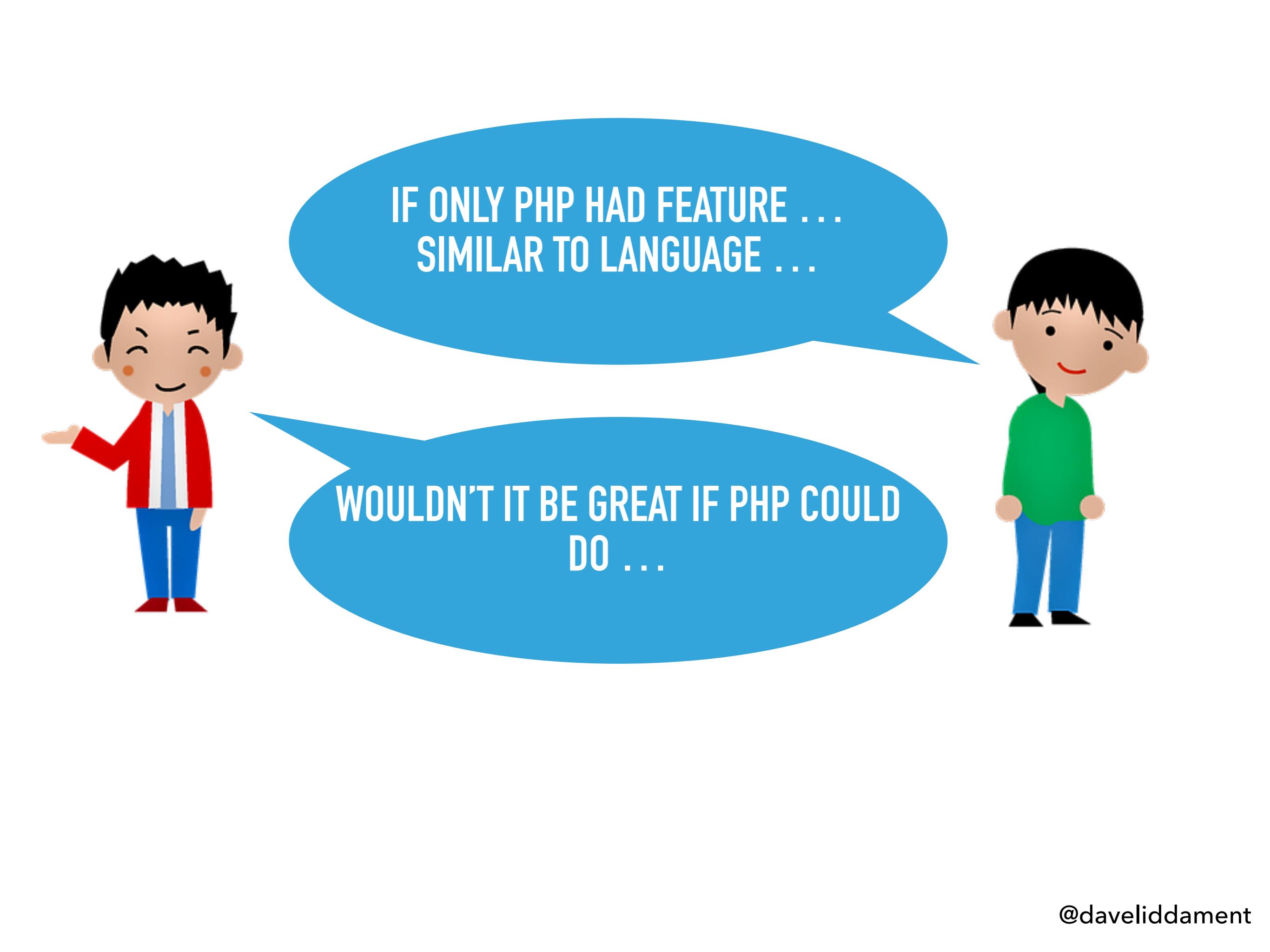


\*\*\* **amsterdam PHP**

# **Extending the PHP Language**

**Dave Liddament | Lamp Bristol**

**@daveliddament**



IF ONLY PHP HAD FEATURE ...  
SIMILAR TO LANGUAGE ...

WOULDN'T IT BE GREAT IF PHP COULD  
DO ...

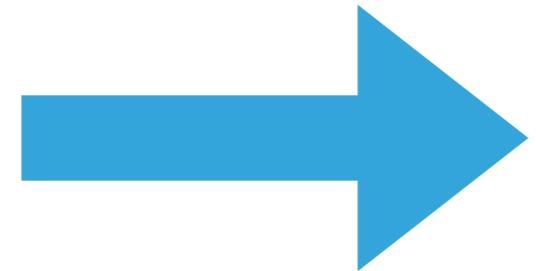


IF ONLY PHP HAD FEATURE ...  
SIMILAR TO LANGUAGE ...

WOULDN'T IT BE GREAT IF PHP COULD  
DO ...

## HOW I BUILT NEW LANGUAGE FEATURES

Very  
specific  
constraint

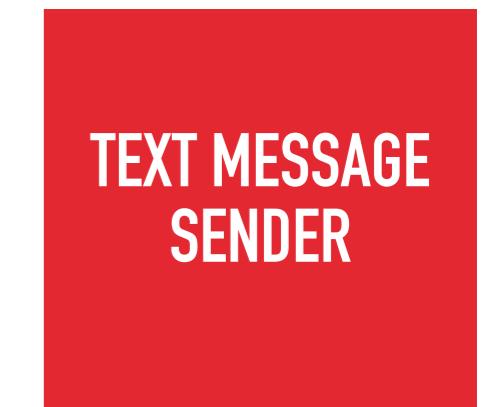
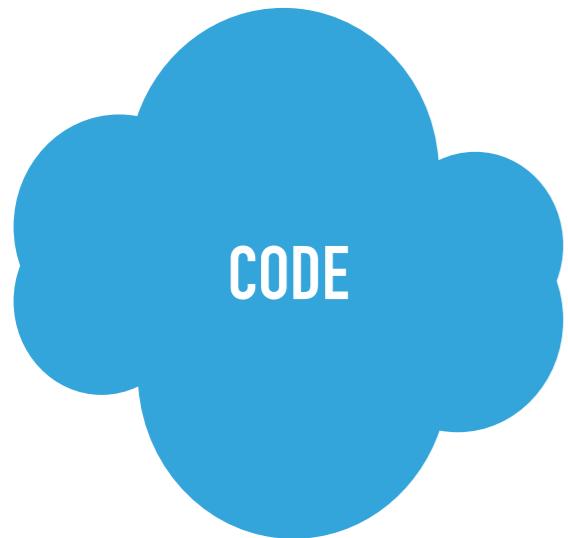


Generalised  
version that  
could be a  
useful on your  
project

# Preconditions



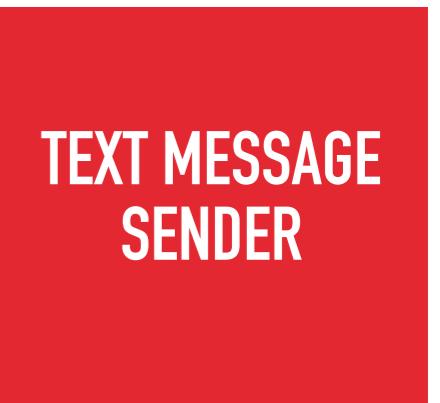
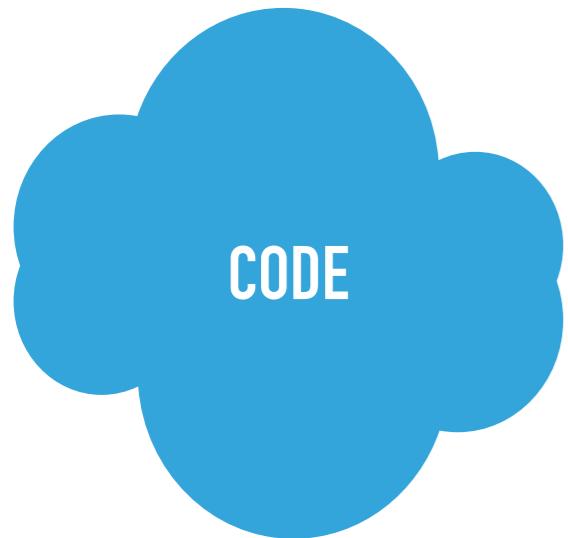
# One of many examples...



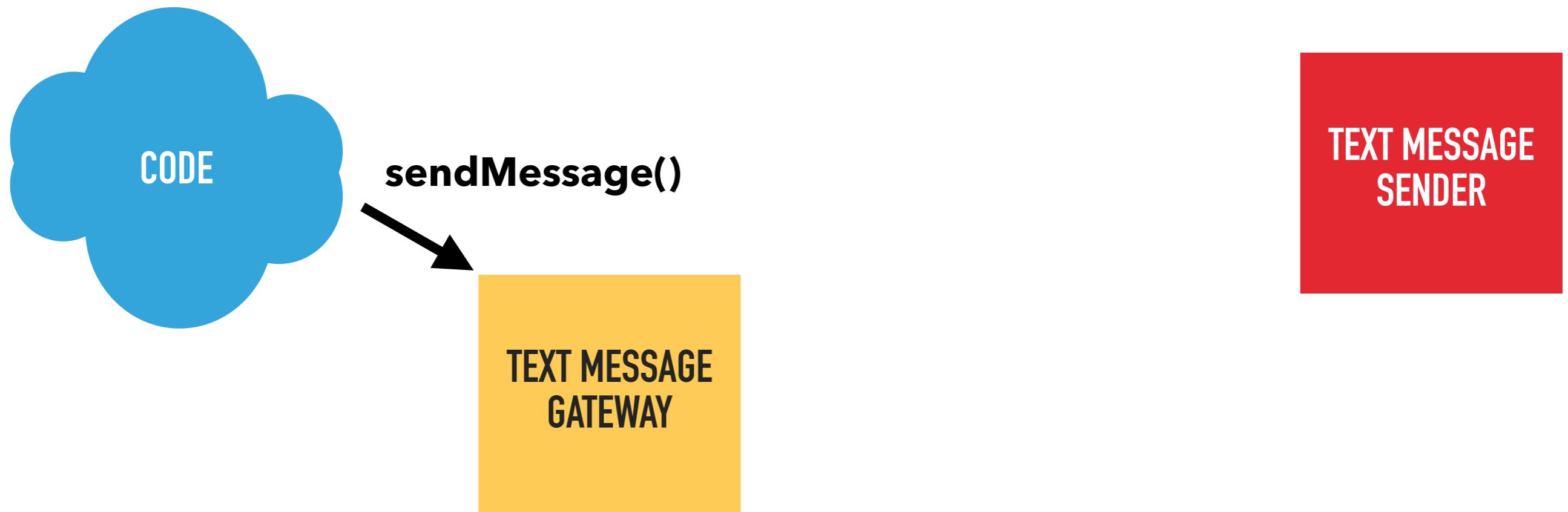
# One of many examples...



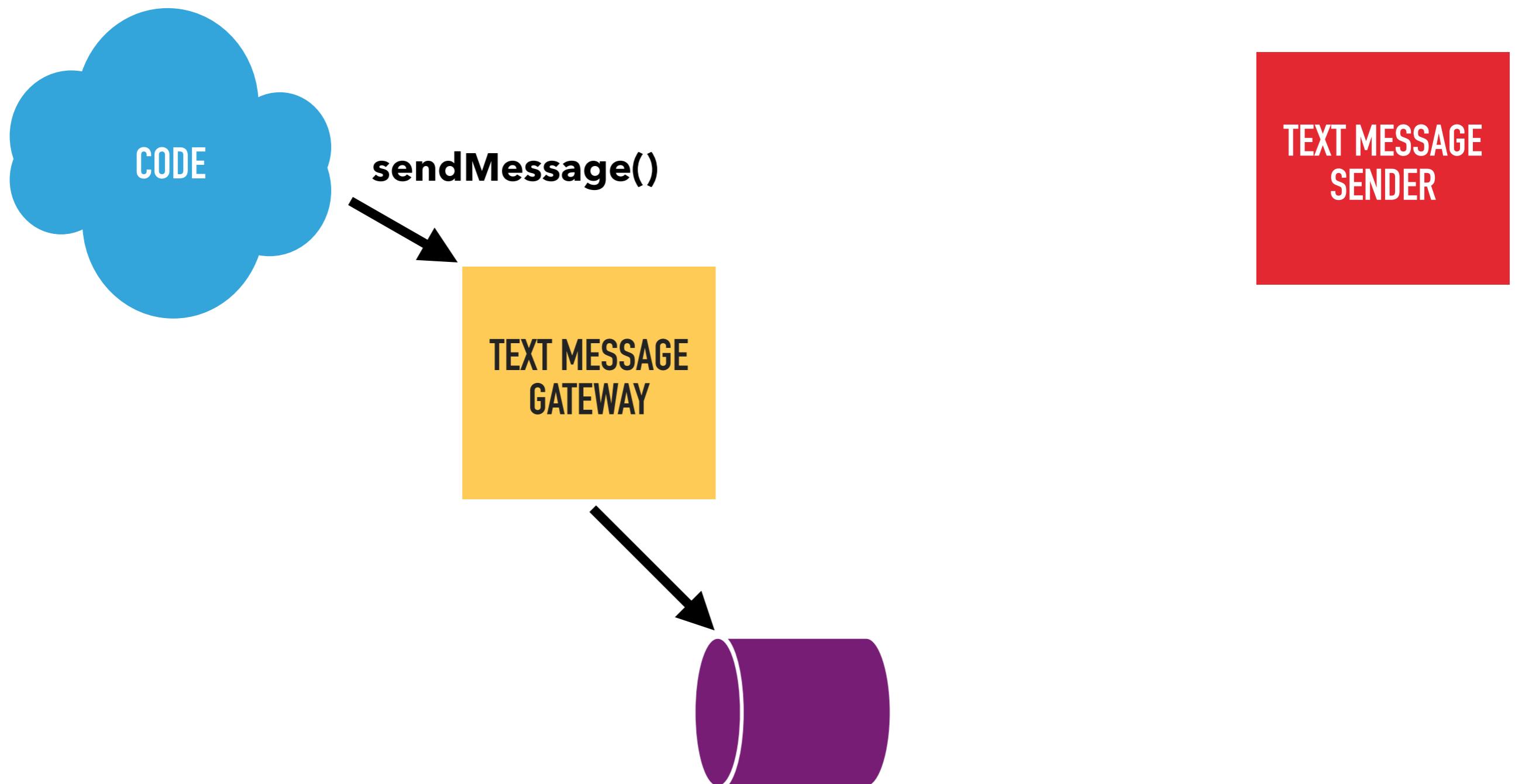
# One of many examples...



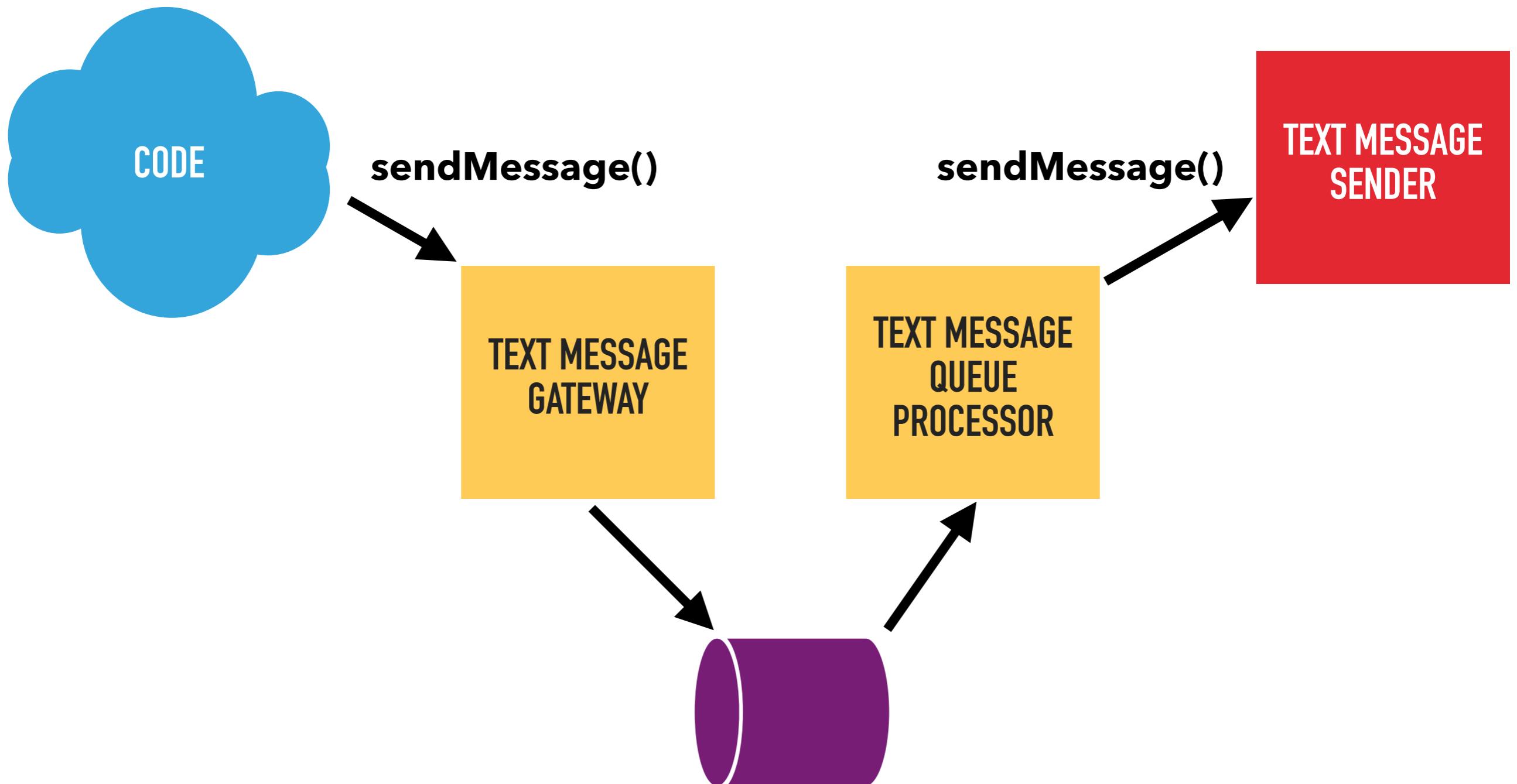
# One of many examples...



# One of many examples...



# One of many examples...



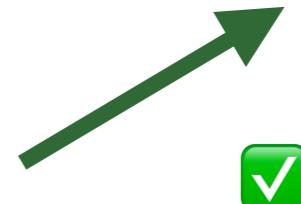
TEXT MESSAGE  
SENDER

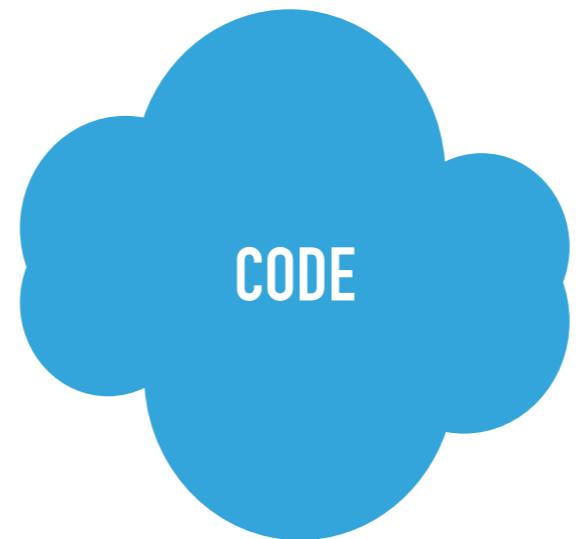
**sendMessage()**

TEXT MESSAGE  
SENDER

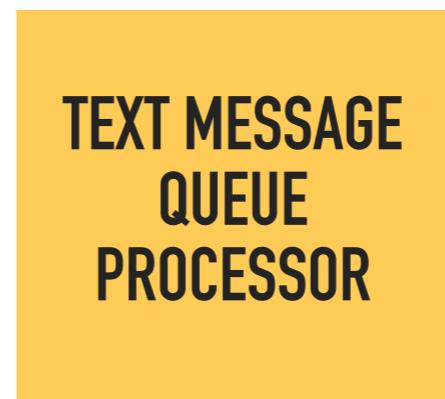
**sendMessage()**

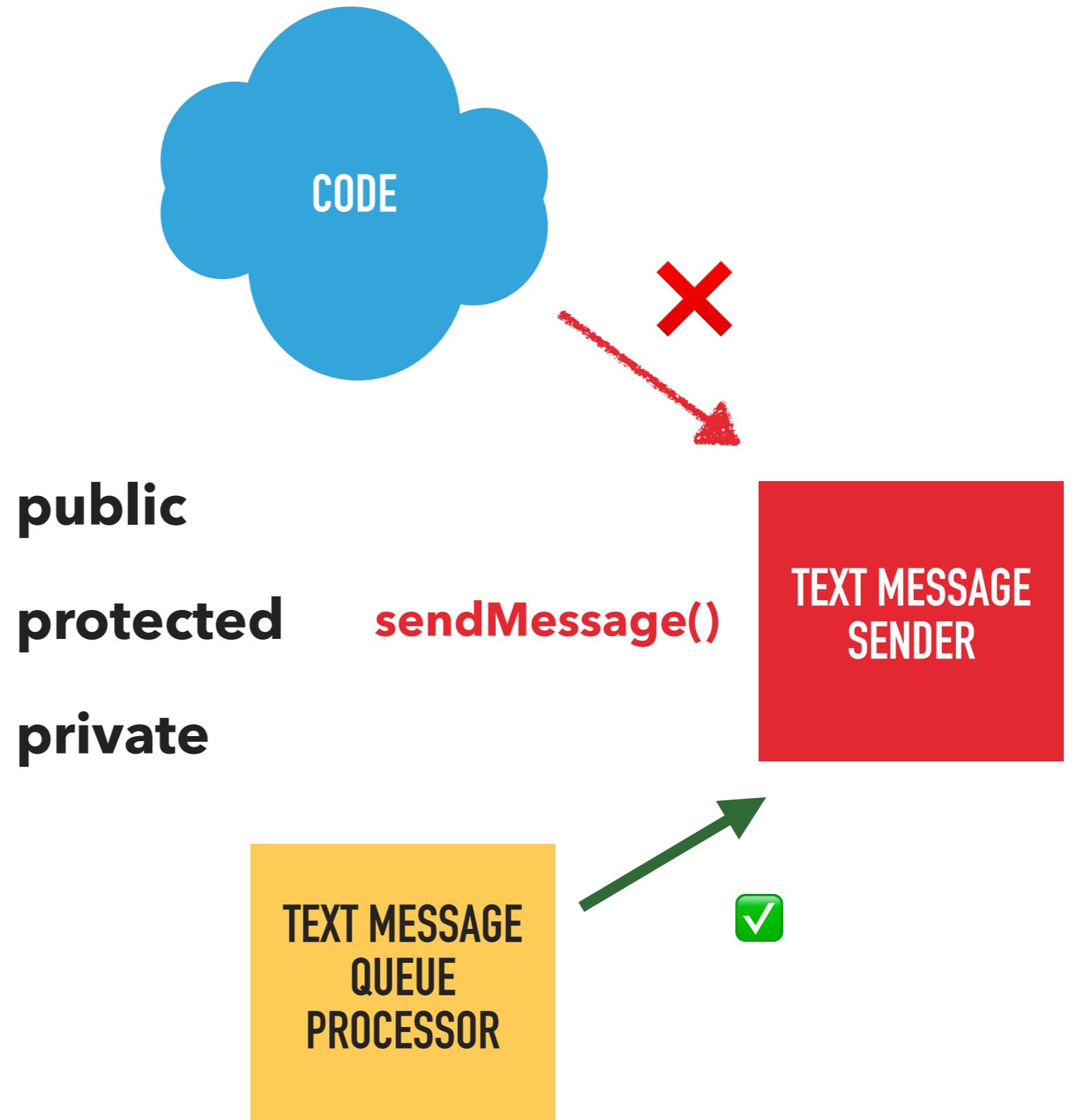
TEXT MESSAGE  
QUEUE  
PROCESSOR





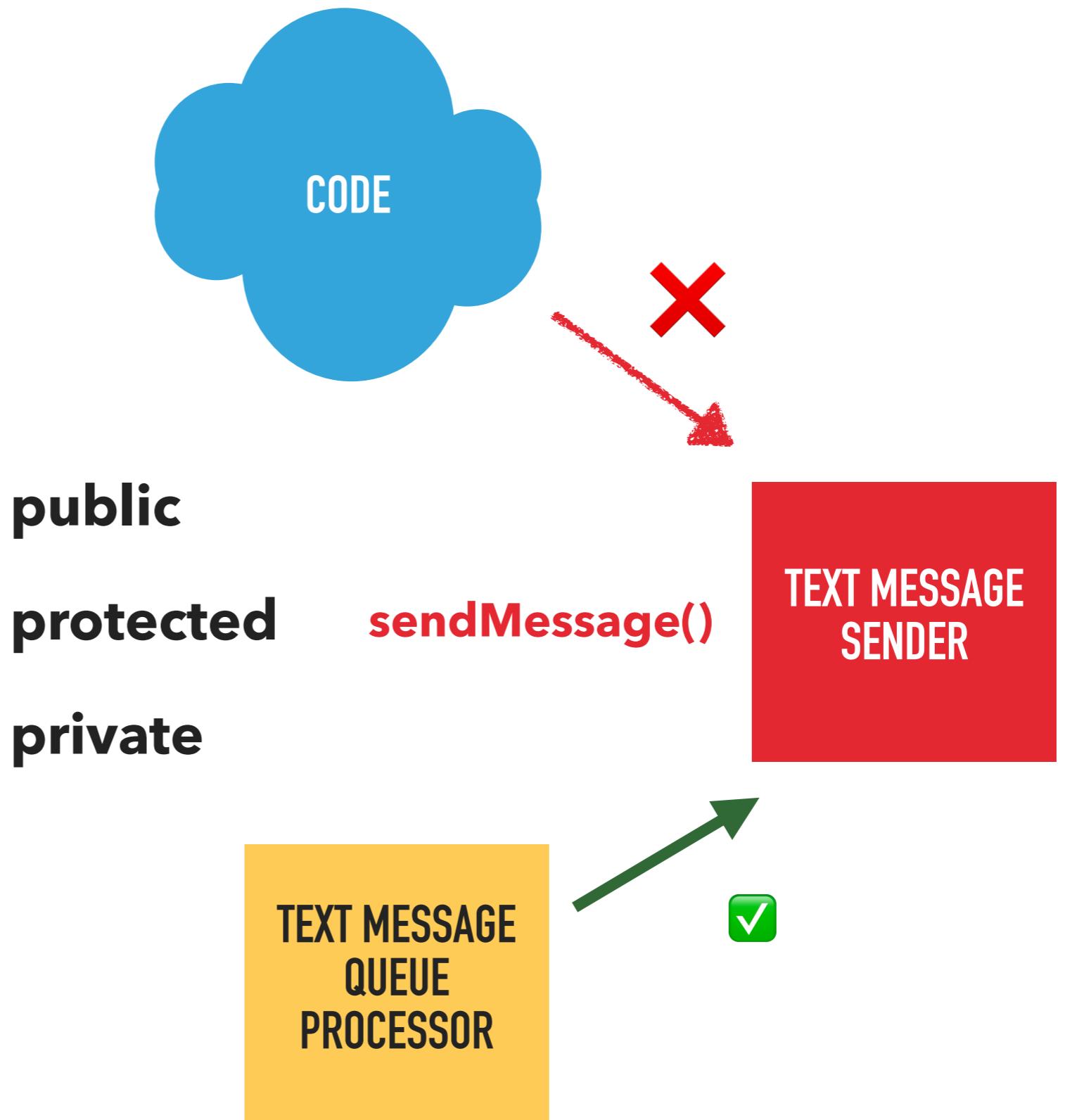
**sendMessage()**





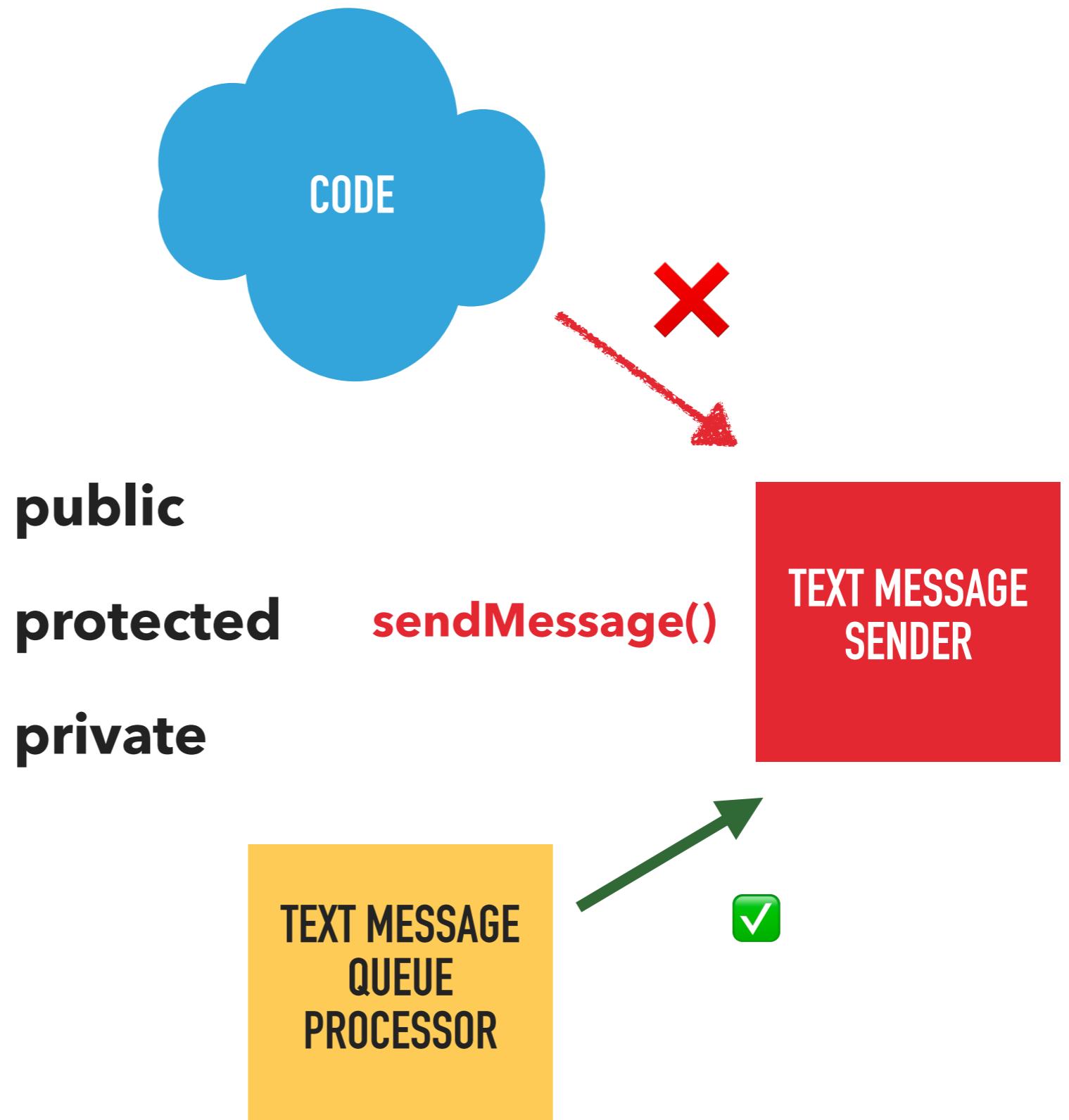
*Existing visibility  
modifiers are not  
fine grained  
enough.*

*We need more  
control.*



*Existing visibility  
modifiers are not  
fine grained  
enough.*

*We need more  
control.*



**Automate checks to stop me, or other  
developers, breaking this constraint**

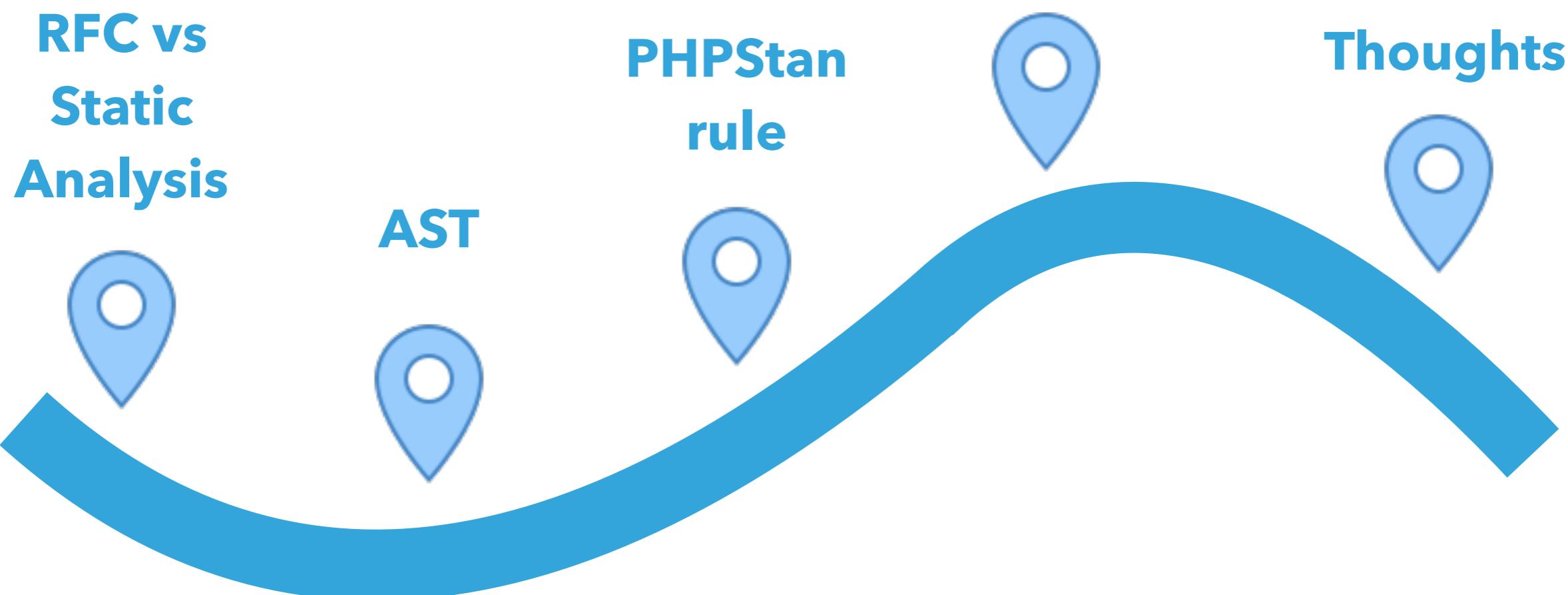
**RFC vs  
Static  
Analysis**

**AST**

**PHPStan  
rule**

**PHP Extension  
Library**

**Thoughts**



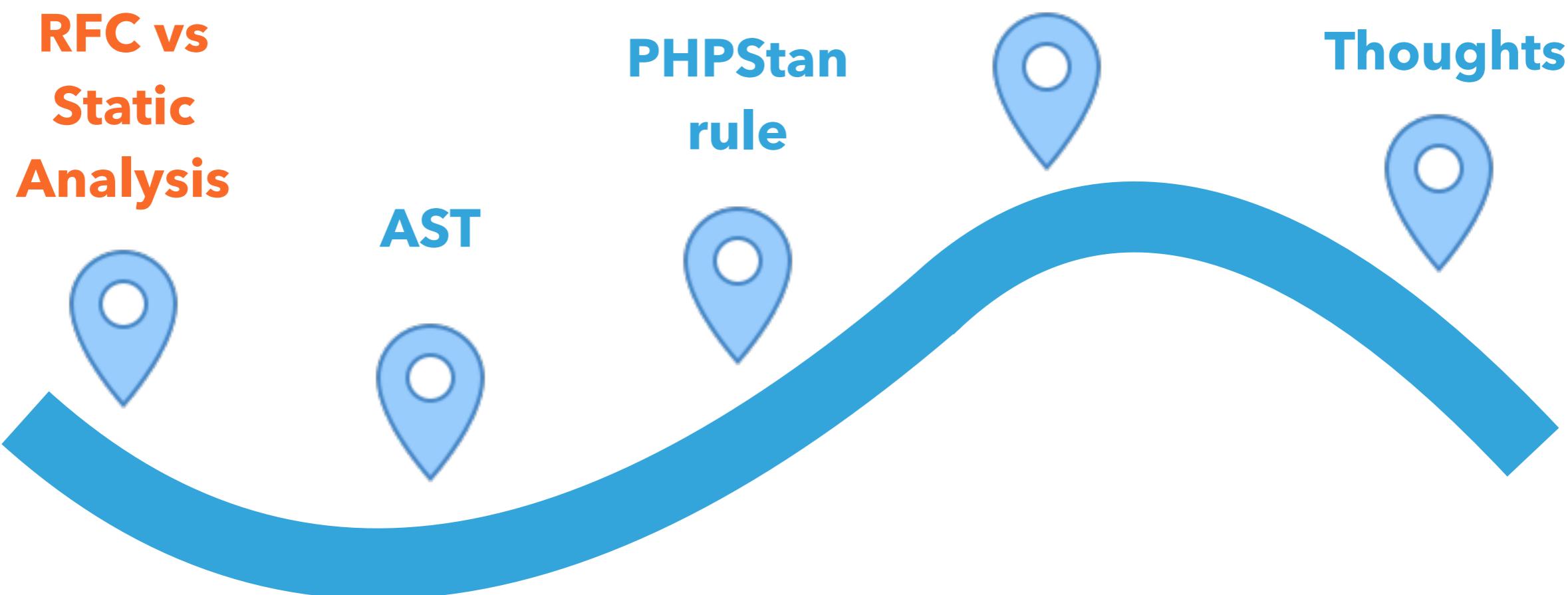
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Static  
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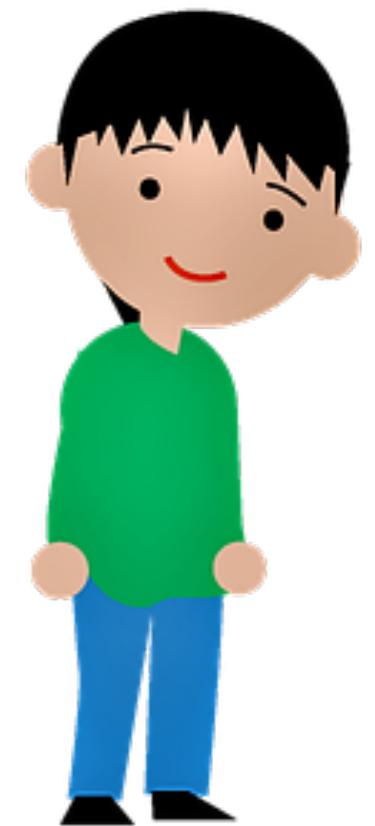
**PHPStan  
rule**

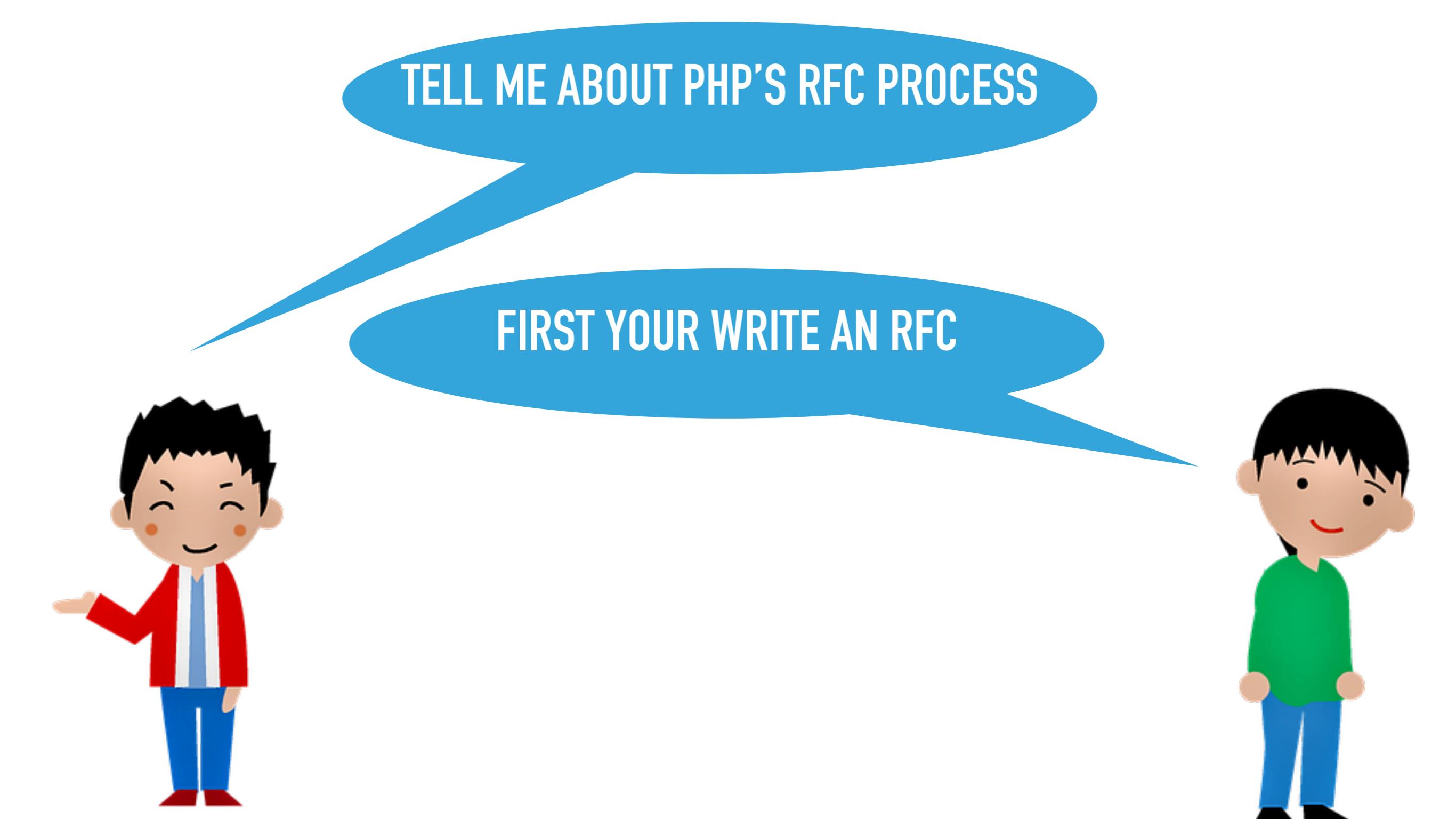
**PHP Extension  
Library**

**Thoughts**



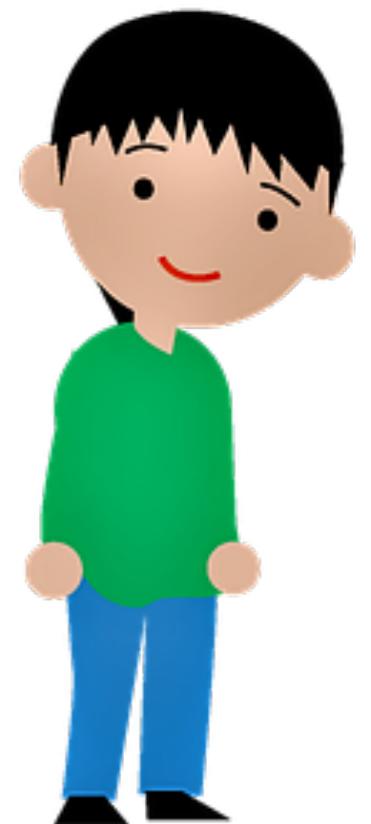
TELL ME ABOUT PHP'S RFC PROCESS

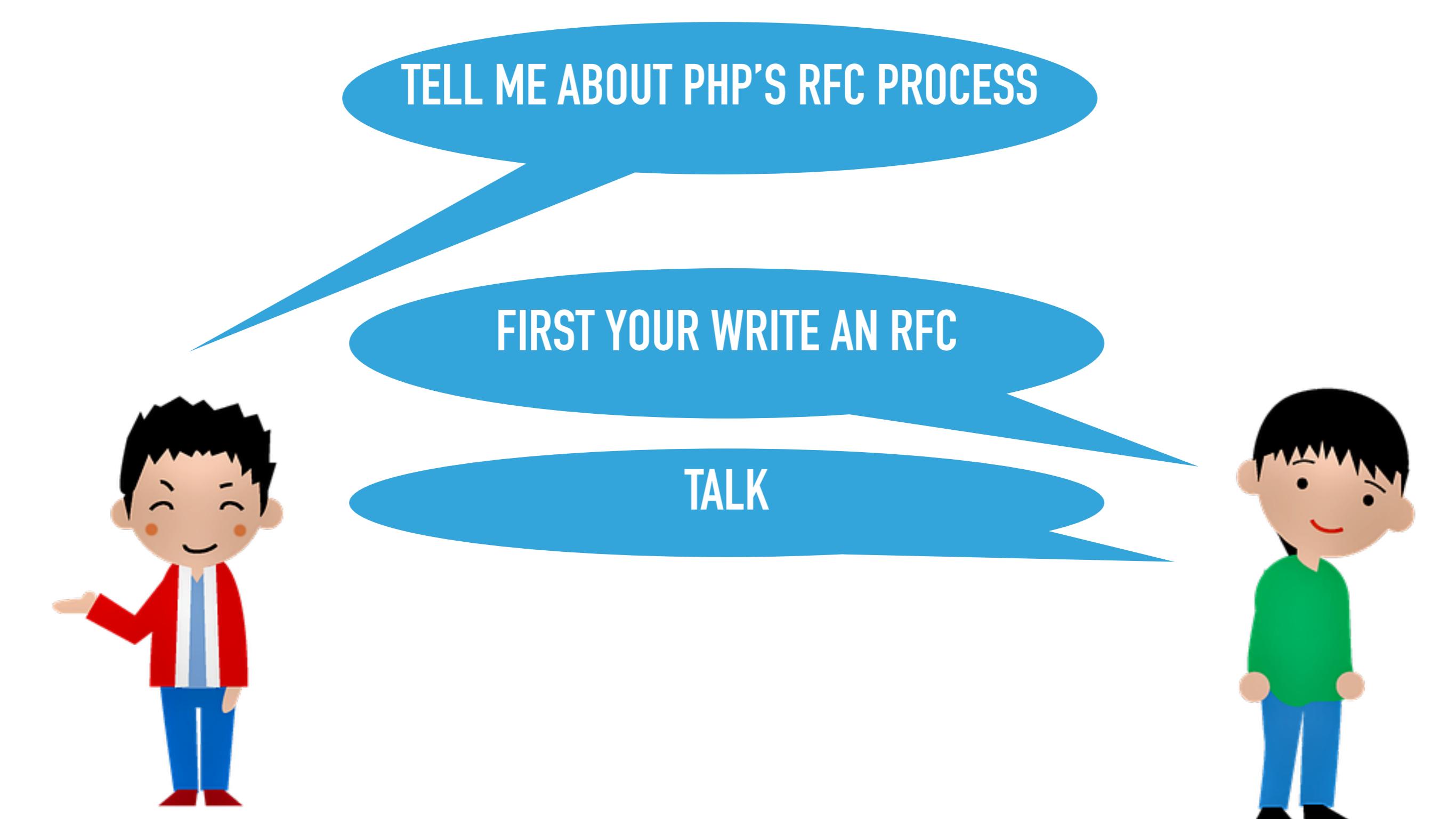




TELL ME ABOUT PHP'S RFC PROCESS

FIRST YOU WRITE AN RFC

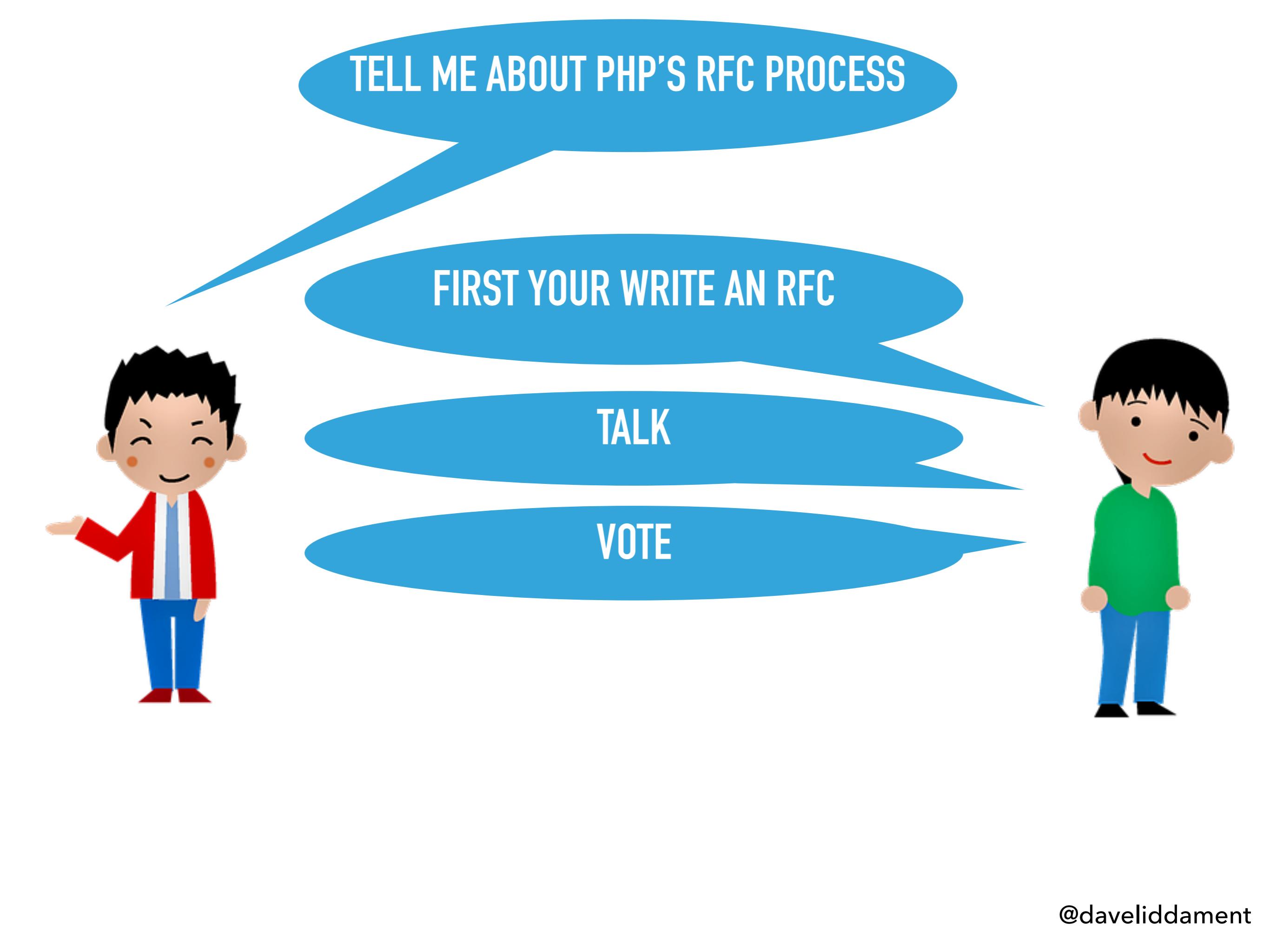




TELL ME ABOUT PHP'S RFC PROCESS

FIRST YOU WRITE AN RFC

TALK

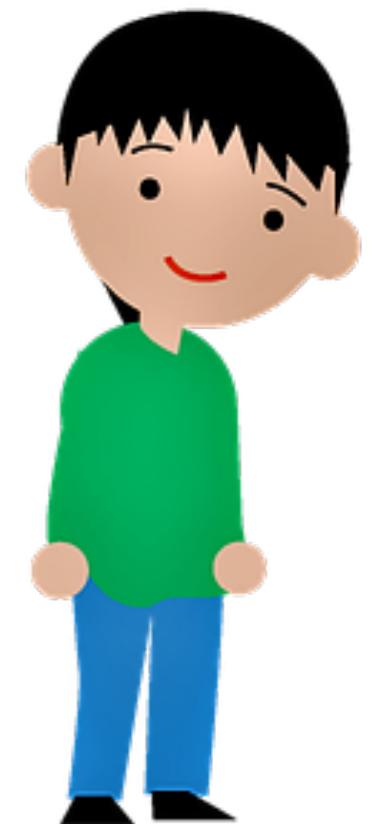


TELL ME ABOUT PHP'S RFC PROCESS

FIRST YOU WRITE AN RFC

TALK

VOTE



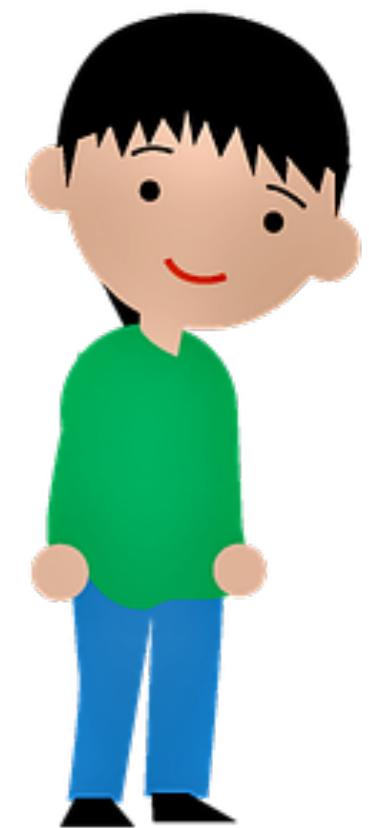
TELL ME ABOUT PHP'S RFC PROCESS

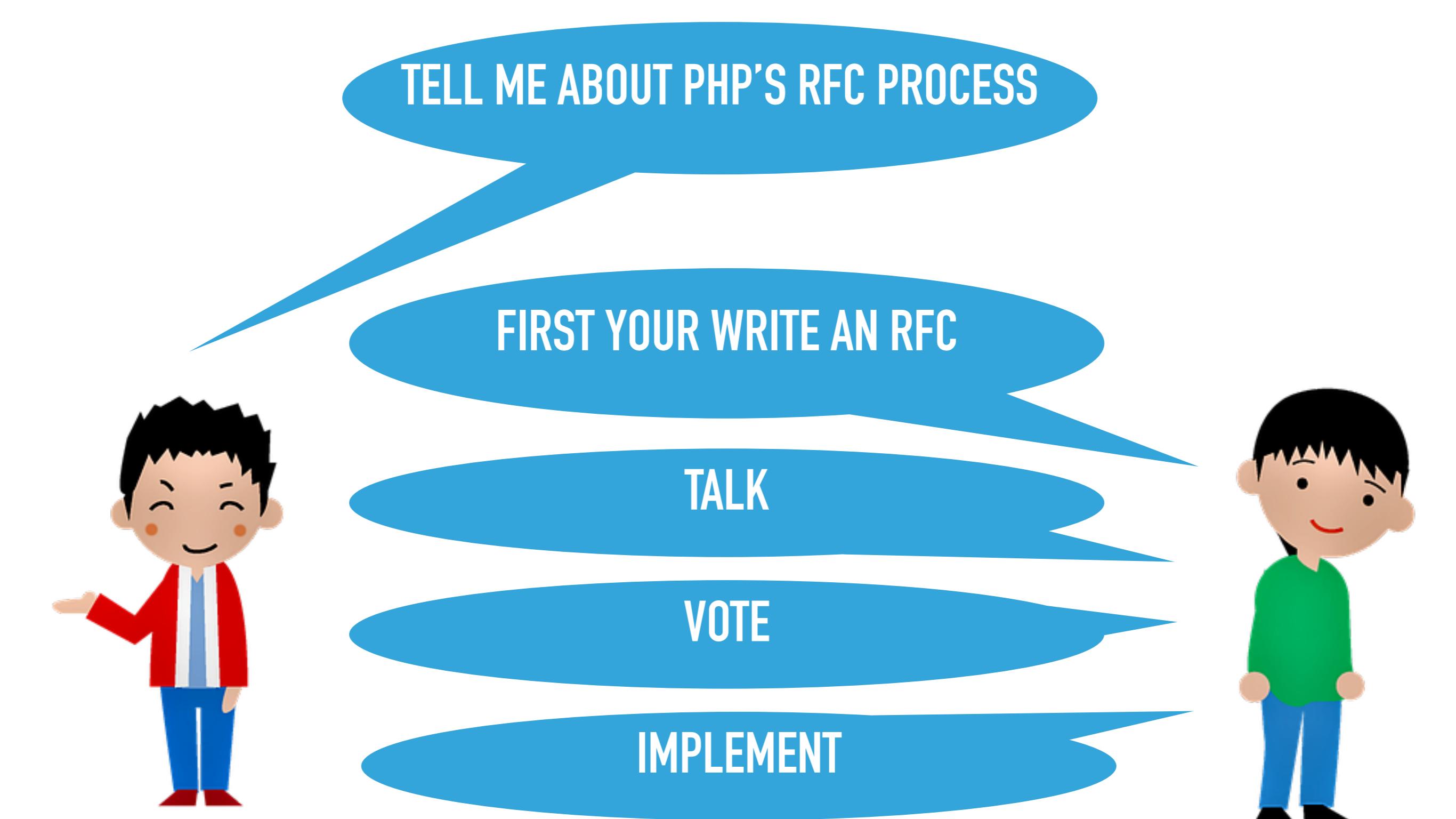
FIRST YOU WRITE AN RFC

TALK

VOTE

IMPLEMENT





TELL ME ABOUT PHP'S RFC PROCESS

FIRST YOU WRITE AN RFC

TALK

VOTE

IMPLEMENT

A LONG AND DIFFICULT PROCESS!

**THERE IS ANOTHER WAY...**

**THERE IS ANOTHER WAY...**

**... FOR SOME FUNCTIONALITY**

# Run time

```
class Person
{
    private function update()
    {
        // Some code
    }
}

$person = new Person();
$person->update();
```

# Run time

```
class Person  
{  
    private function update()  
    {  
        // Some code  
    }  
}
```

```
$person = new Person();  
$person->update();
```

Uncaught Error: Call to private  
method Person::update()

# Static analysis

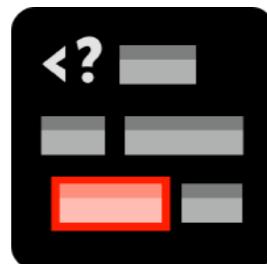
```
class Person
{
    private function update()
    {
        // Some code
    }
}
```

```
$person = new Person();
$person->update();
```

# Static analysis

```
class Person
{
    private function update()
    {
        // Some code
    }
}
```

```
$person = new Person();
$person->update(); X
```



# Static analysis gives us generics now

```
/** @return Person[] */
function getPeople():array {...}

function process(Car $car) {...}

for (getPeople() as $person) {
    process($person);
}
```

# Static analysis gives us generics now

```
/** @return Person[] */
function getPeople():array {...}

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```



# Add static analysis to dev process



# Add static analysis to dev process



Create custom rules to emulate  
new language features

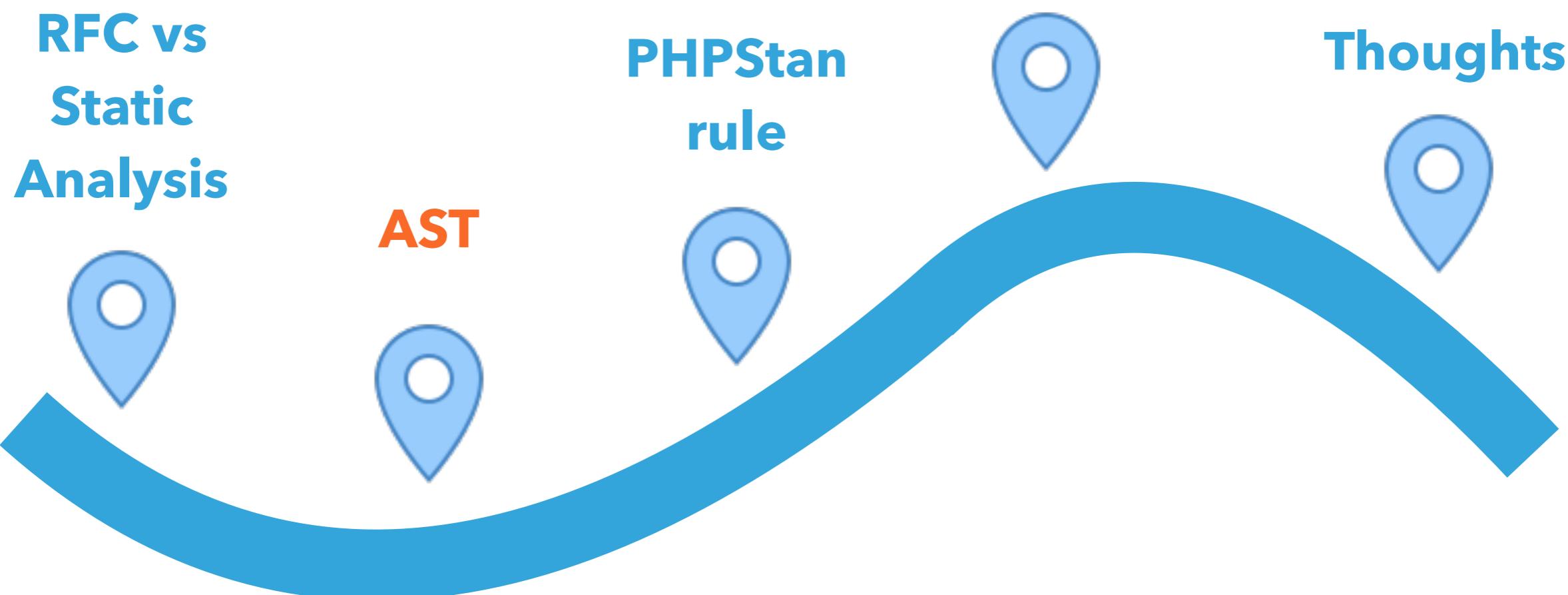
**RFC vs  
Static  
Analysis**

**AST**

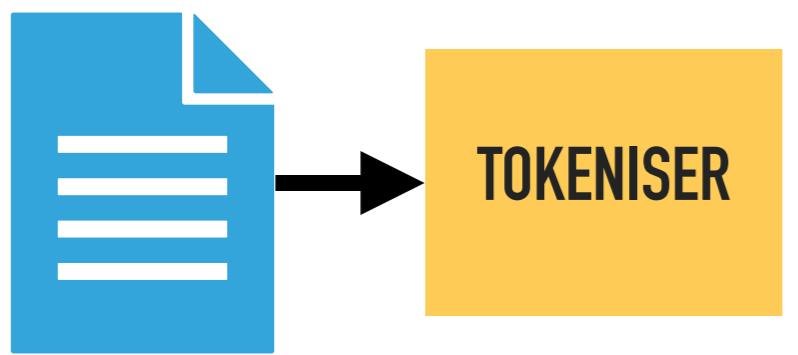
**PHPStan  
rule**

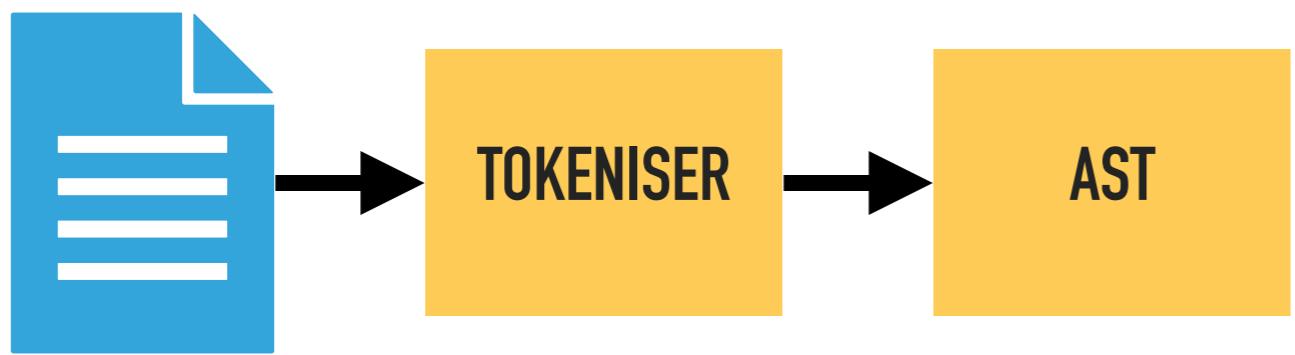
**PHP Extension  
Library**

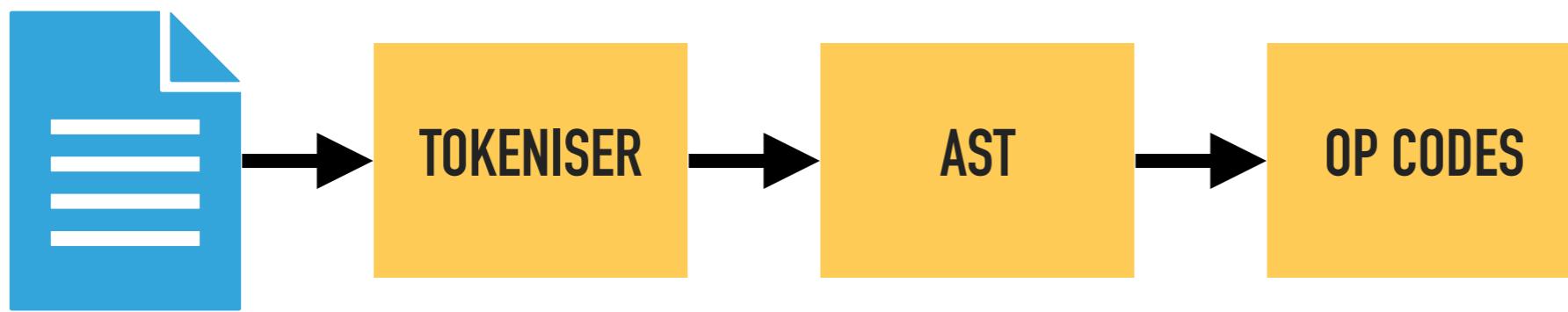
**Thoughts**

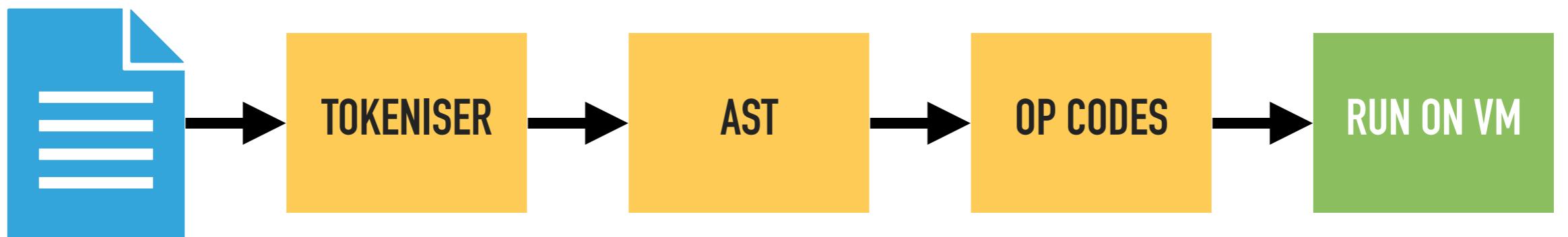


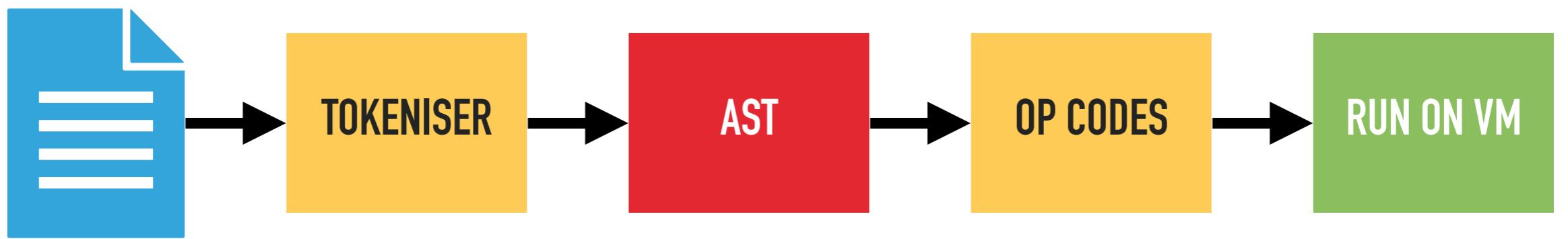












```
class PersonNotifier
{
    private TextMessageSender $sender;
    public function __construct() {...}
    public function notifyPlayer() {...}
}
```

```
class PersonNotifier  
{  
    private TextMessageSender $sender;  
    public function __construct() {...}  
    public function notifyPlayer() {...}  
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```

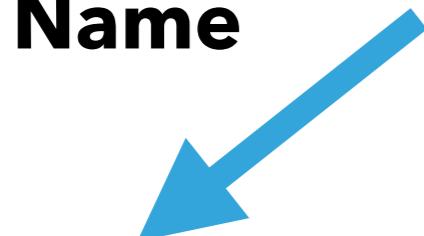
CLASS  
Flags: 0

```
class PersonNotifier  
{  
    private TextMessageSender $sender;  
    public function __construct() {...}  
    public function notifyPlayer() {...}  
}
```

Name

CLASS  
Flags: 0

IDENTIFIER  
Name: PersonNotifier



```
class PersonNotifier
```

```
{
```

```
    private TextMessageSender $sender;  
    public function __construct() {...}  
    public function notifyPlayer() {...}
```

```
}
```

**Name**



CLASS  
Flags: 0

**Statements**



CLASS METHOD  
Flags: 1

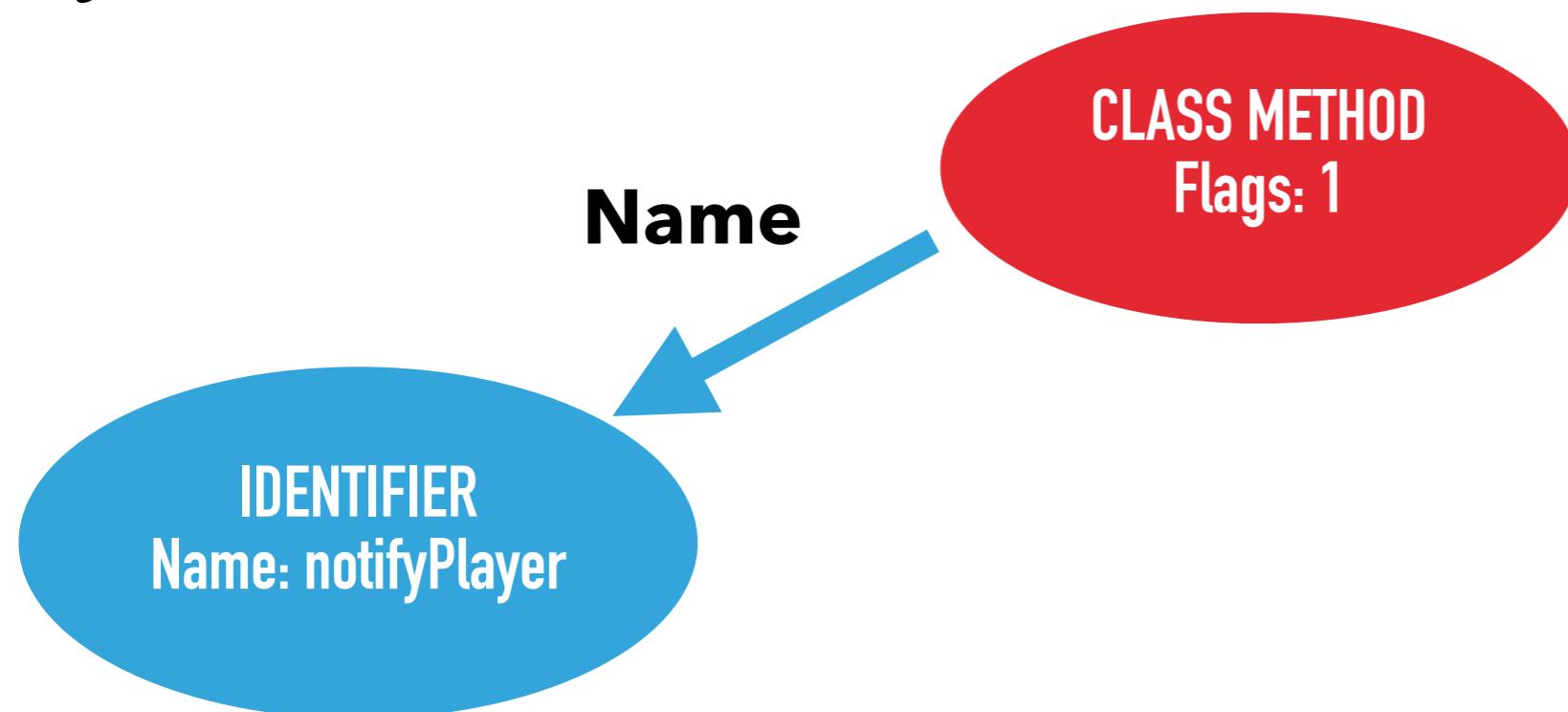


```
public function notifyPlayer (string $msg)
{
    $this->sender->sendMessage ($msg) ;
}
```

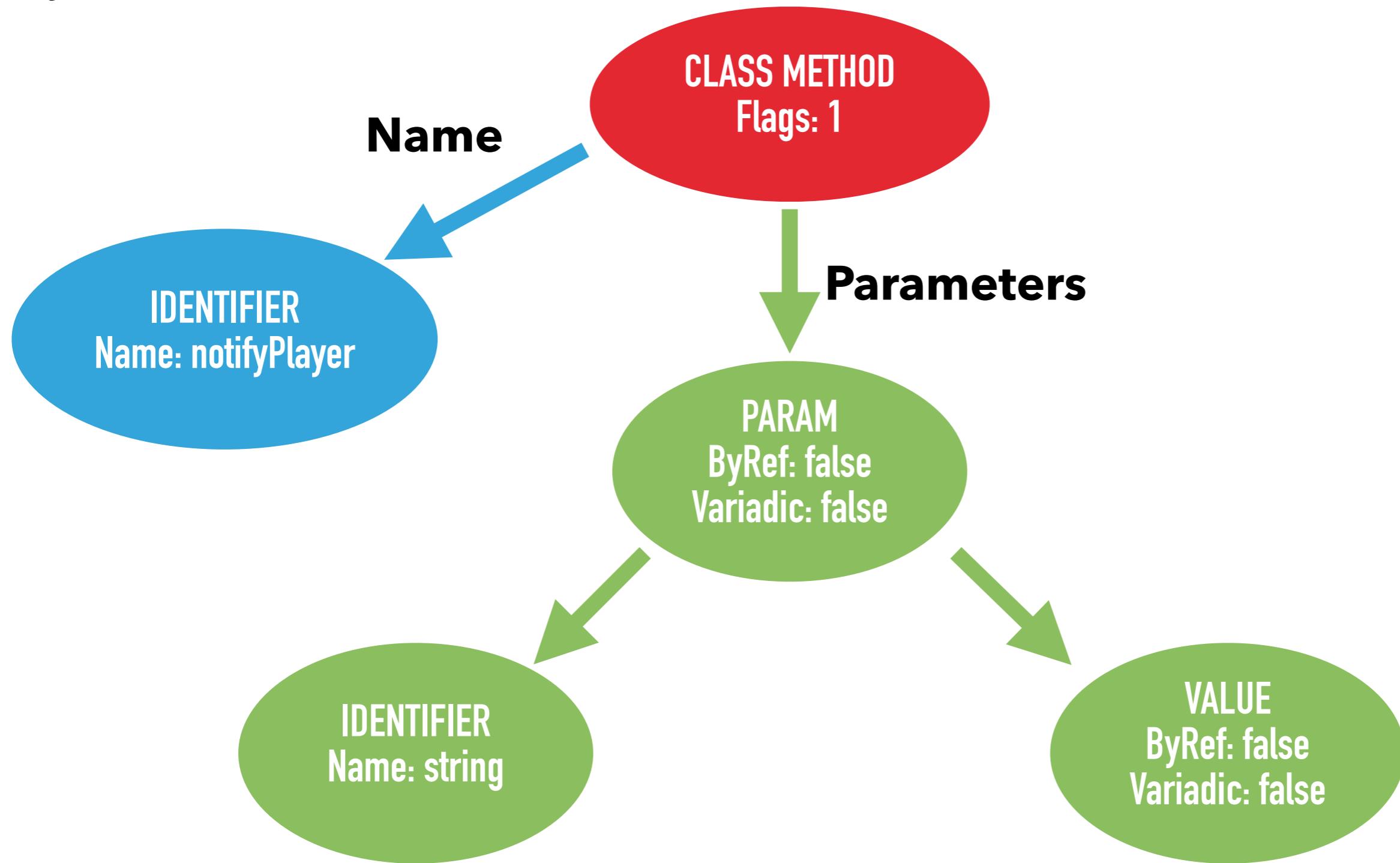
```
public function notifyPlayer (string $msg)  
{  
    $this->sender->sendMessage ($msg) ;  
}
```

CLASS METHOD  
Flags: 1

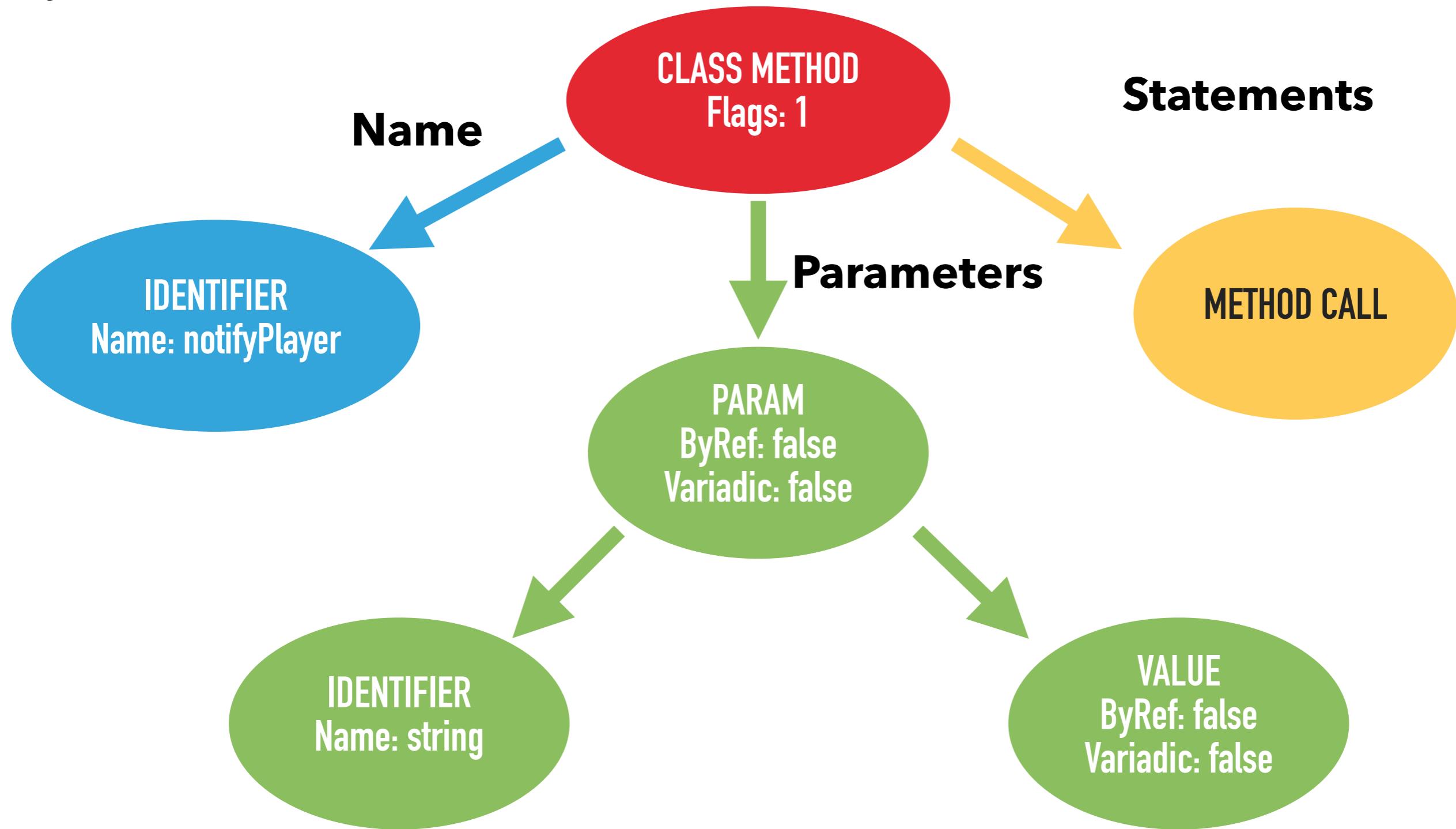
```
public function notifyPlayer (string $msg)  
{  
    $this->sender->sendMessage ($msg);  
}
```



```
public function notifyPlayer (string $msg)  
{  
    $this->sender->sendMessage ($msg) ;  
}
```



```
public function notifyPlayer (string $msg)  
{  
    $this->sender->sendMessage ($msg);  
}
```



# <https://github.com/nikic/PHP-Parser>

[nikic / PHP-Parser](#) Public

[Watch 232](#) [Fork 891](#)

[Code](#) [Issues 44](#) [Pull requests 9](#) [Actions](#) [Wiki](#) [Security](#) [Insights](#)

[master](#) [9 branches](#) [80 tags](#)

[Go to file](#) [Add file](#) [Code](#)

 nikic	Bail out on PHP tags in removed code	...
	b0edd4c	2 hours ago
		1,526 commits
	.github/workflows	Test PHP 8.2 in CI
	bin	Add --version flag to php-parse
	doc	Fix pretty printing example
	grammar	Support readonly before DNF type
	lib/PhpParser	Bail out on PHP tags in removed code
	test	Bail out on PHP tags in removed code
	test_old	Avoid repeatedly downloading archive in run-php-src.sh
	tools	Add tools/ directory
	.editorconfig	[PHP 8.1] Add support for enums ( <a href="#">#758</a> )
	.gitattributes	Add CONTRIBUTING.md
	.gitignore	gitignore: add phunit test cache
	.php-cs-fixer.dist.php	Also format the grammar directory
	CHANGELOG.md	Release PHP-Parser 5.0.0-alpha1
	CONTRIBUTING.md	Add CONTRIBUTING.md
	LICENSE	Corrected license text
	README.md	Partial documentation update
	UPGRADE-1.0.md	Fix typos

**About**  
A PHP parser written in PHP

[php](#) [parser](#) [static-analysis](#) [ast](#)

[Readme](#) [BSD-3-Clause license](#) [15.7k stars](#) [232 watching](#) [891 forks](#)

**Releases** 76

[PHP-Parser 4.15.1](#) Latest 18 days ago

[+ 75 releases](#)

**Packages**  
No packages published

**Used by** 1.5m

 + 1,486,143

**Contributors** 123

# <https://github.com/nikic/PHP-Parser>

The screenshot shows the GitHub repository page for 'nikic/PHP-Parser'. The page has a light gray header with the repository name and a 'Public' badge. On the right, there are 'Watch' (232), 'Fork' (891), and a dropdown menu. Below the header, there's a navigation bar with 'Code' (selected), 'Issues' (44), 'Pull requests' (9), 'Actions', 'Wiki', 'Security', and 'Insights'. A search bar is at the top of the main content area. The main content area shows the 'Code' tab. It displays the 'master' branch (9 branches, 80 tags), a commit by 'nikic' (Bail out on PHP tags in removed code) made 2 hours ago, and another commit by 'Test PHP 8.2 in CI' made 3 days ago. To the right, there's an 'About' section with the text 'A PHP parser written in PHP' and tags for 'php', 'parser', 'static-analysis', and 'ast'. There are also links for 'Readme' and 'Issues'.

- ▶ PHP code can be represented by an AST
- ▶ Different types of Node
- ▶ Nodes contain information
- ▶ Each type of node has different information

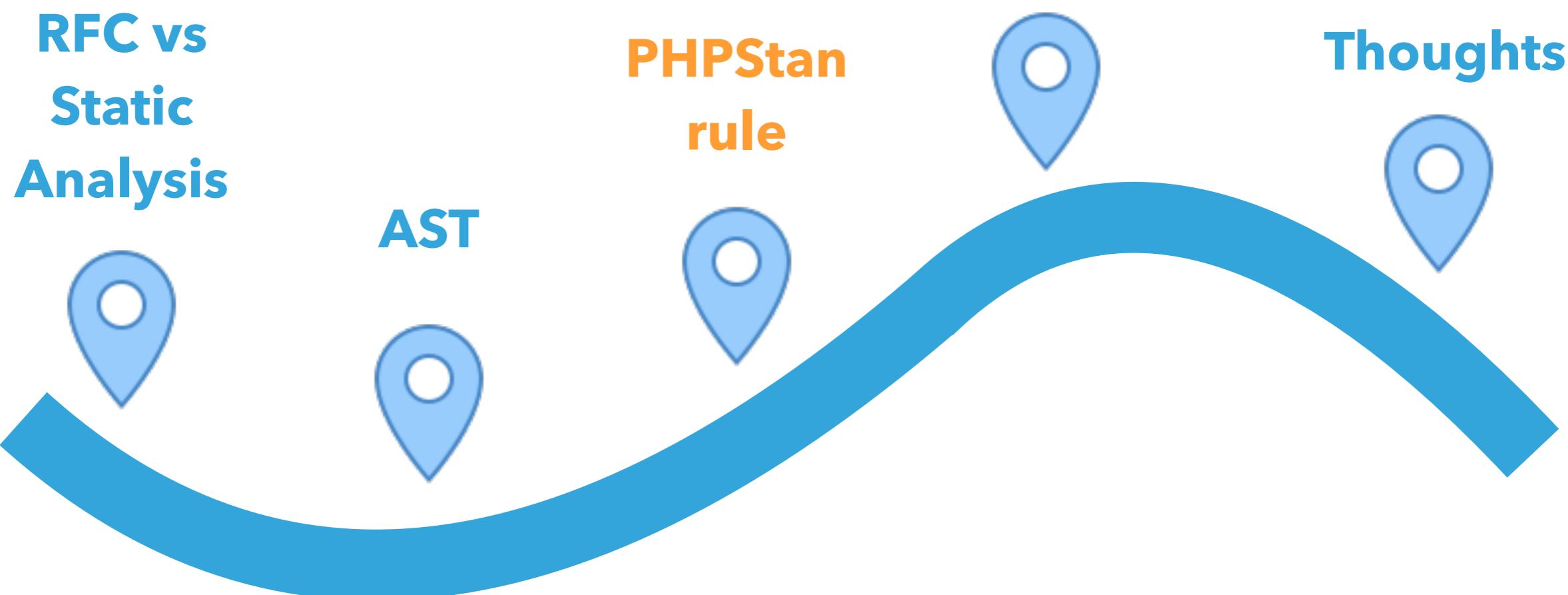
**RFC vs  
Static  
Analysis**

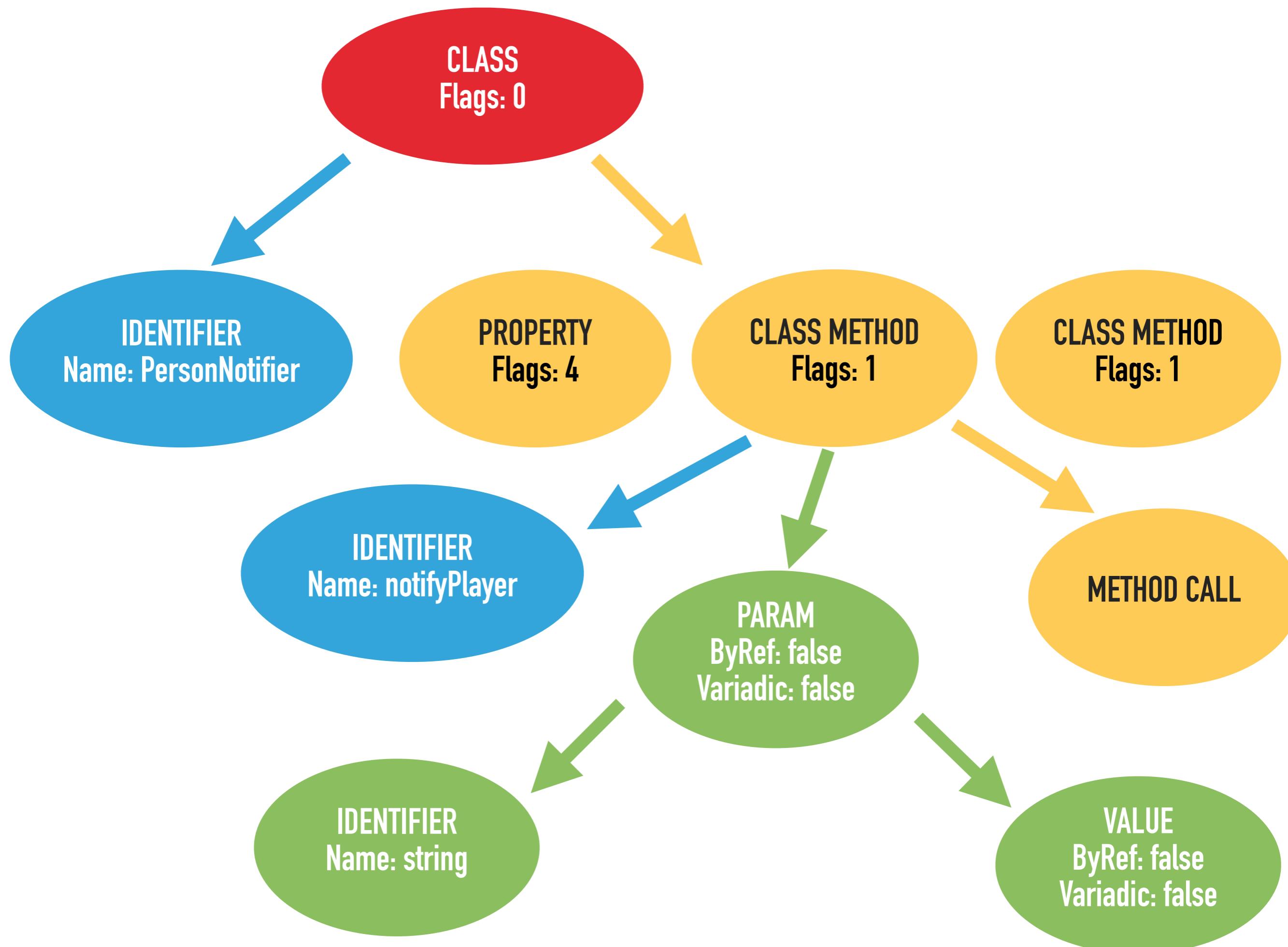
**AST**

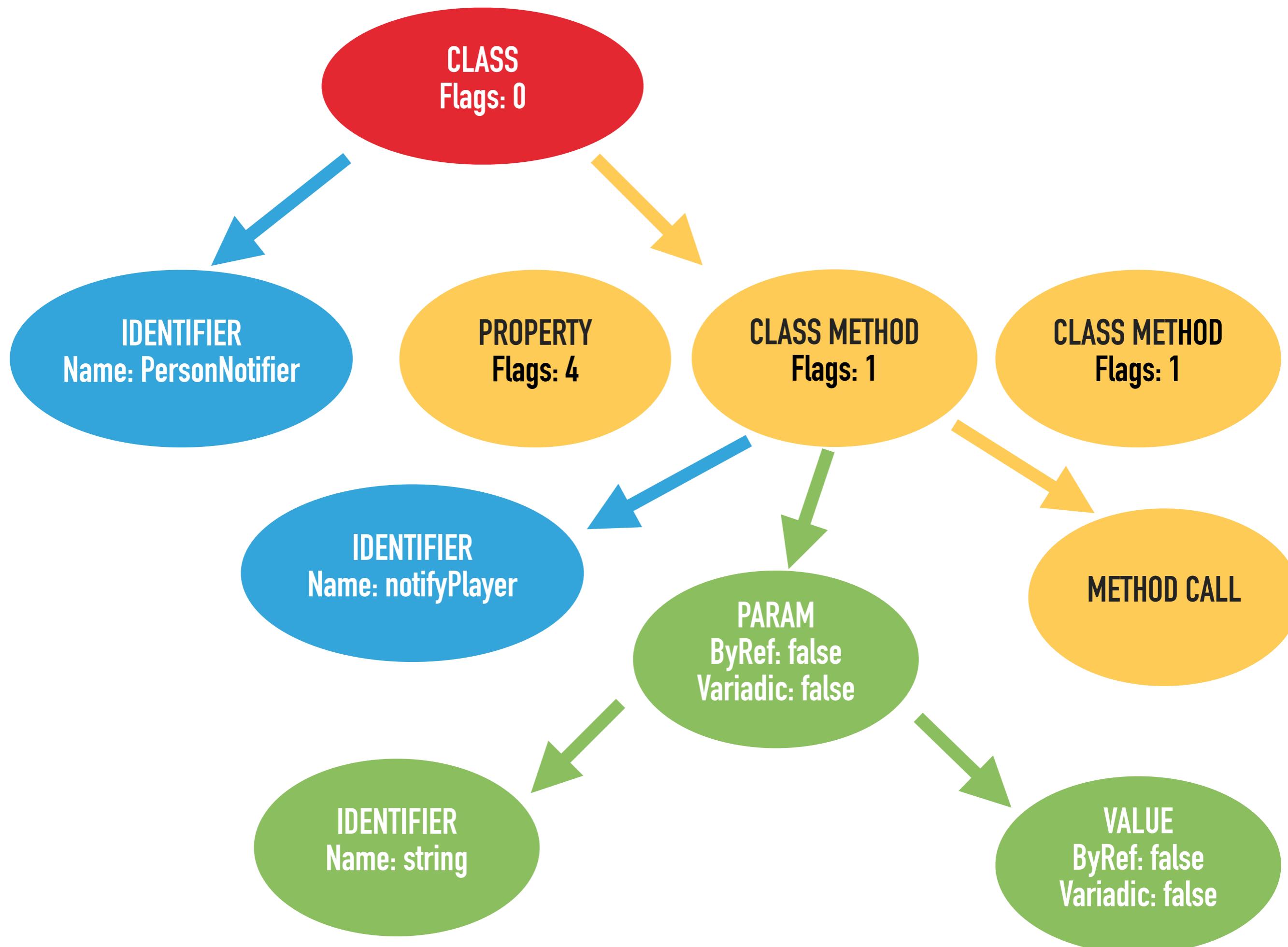
**PHPStan  
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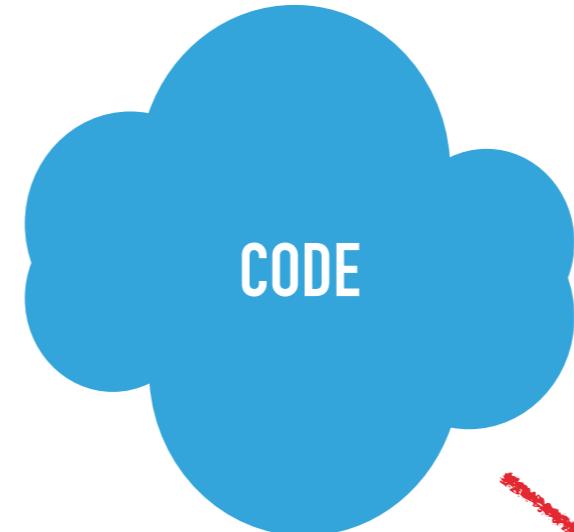




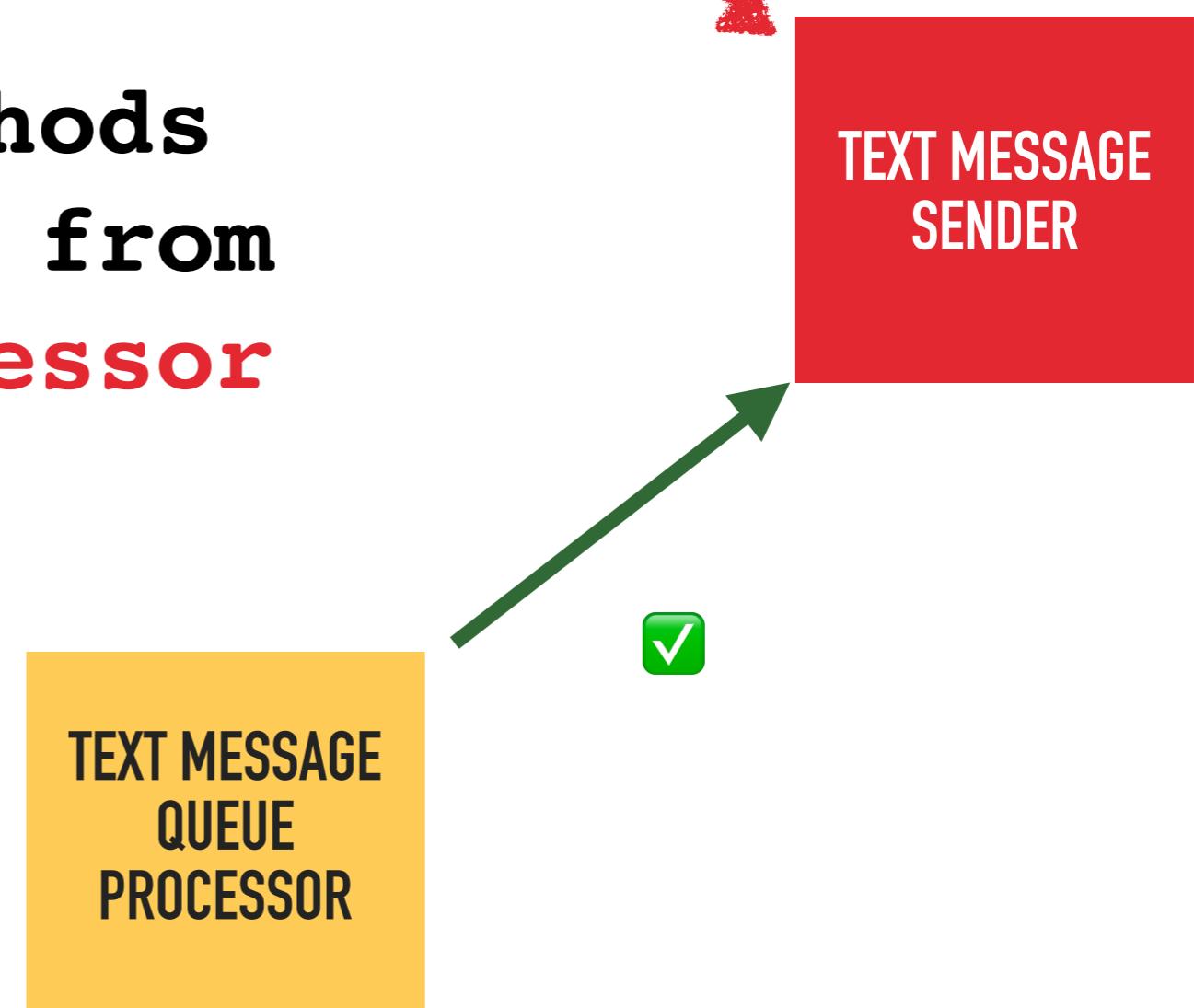
```
interface Rule
{
    public function getNodeType() : string;

    /**
     * @return (string|RuleError)[] errors
     */

    public function processNode(
        \PhpParser\Node $node,
        \PHPStan\Analyser\Scope $scope
    ) : array;
}
```



✗



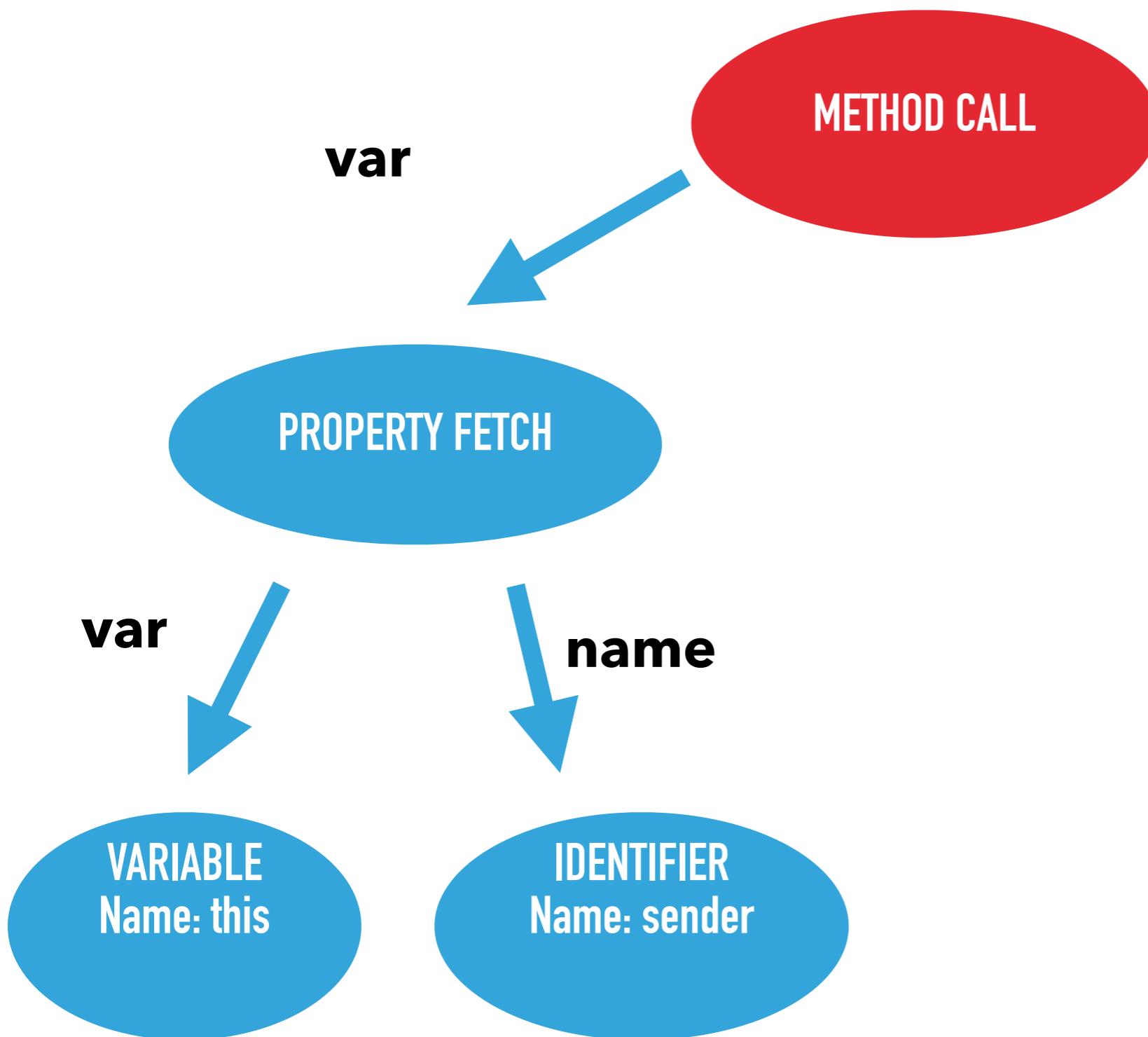
We can only call methods  
in `TextMessageSender` from  
`TextMessageQueueProcessor`

```
$this->sender -> sendMessage ($msg) ;
```

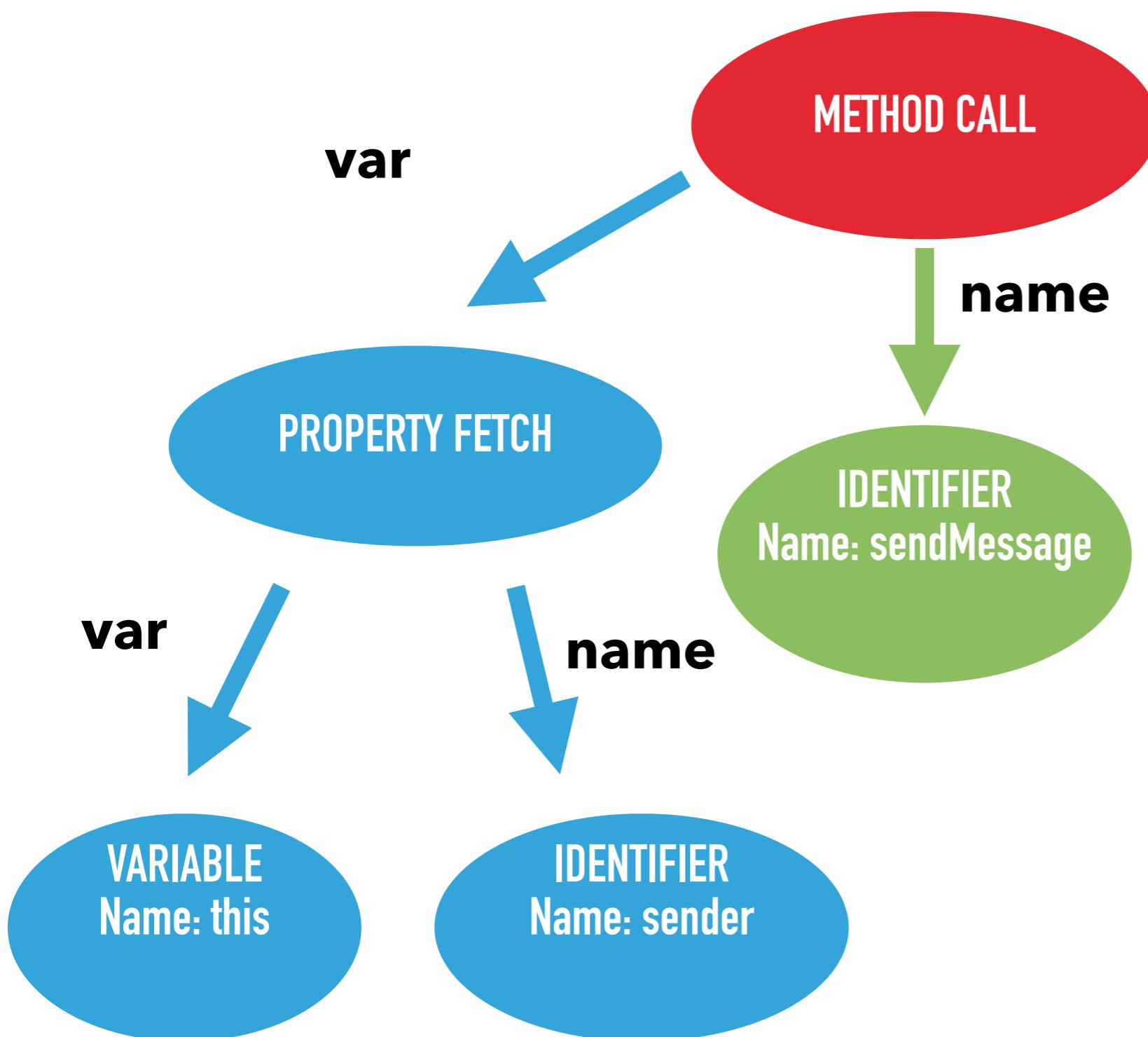


METHOD CALL

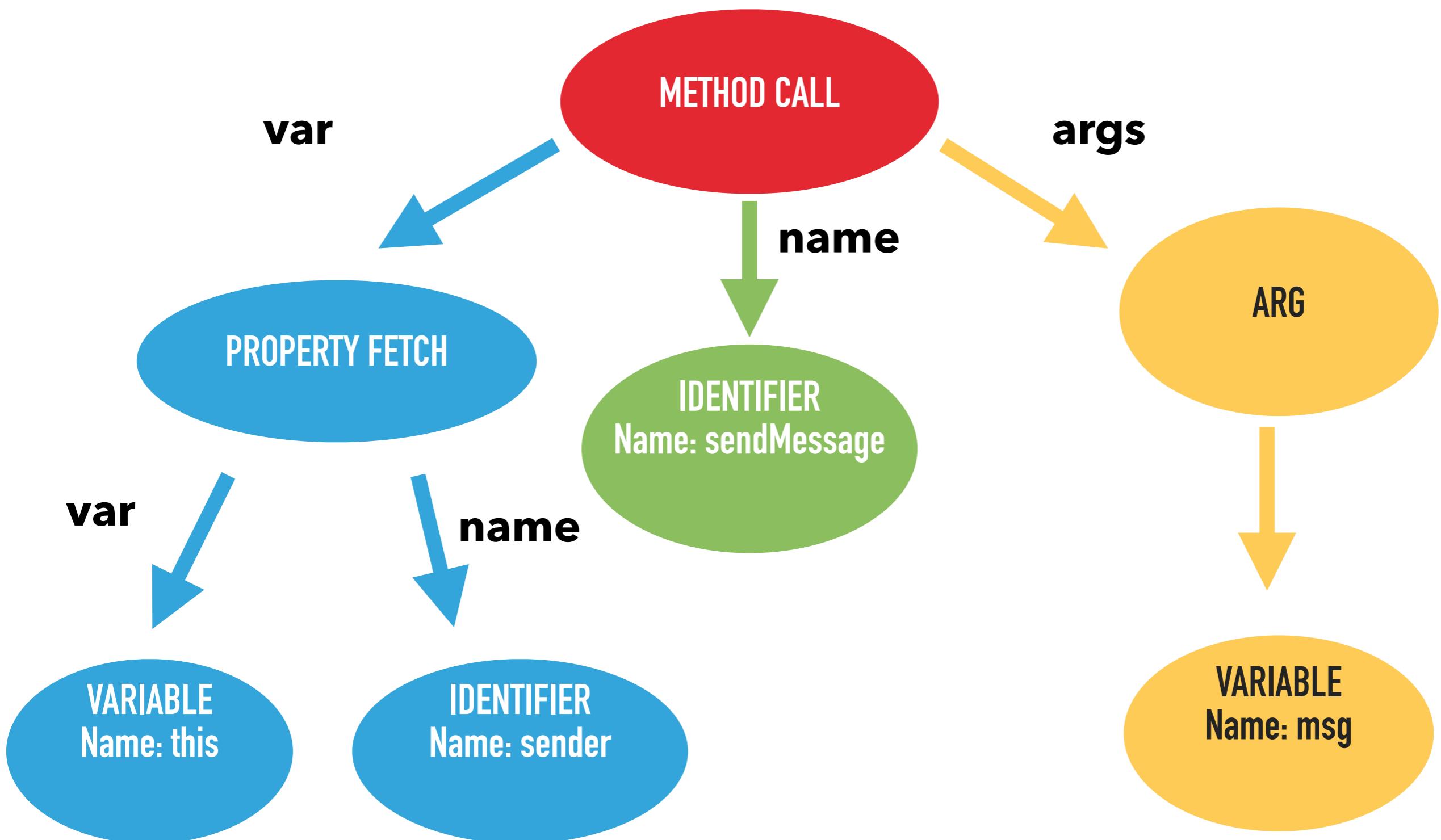
```
$this->sender -> sendMessage ($msg) ;
```



```
$this->sender -> sendMessage ($msg) ;
```



```
$this->sender -> sendMessage($msg);
```



```
class MethodCall extends \PhpParser\Node\Expr\CallLike
{
    /** @var Expr Variable holding object */
    public $var;

    /** @var Identifier|Expr Method name */
    public $name;

    /** @var array<Arg|VariadicPlaceholder> Arguments */
    public $args;

    // Rest of class ...
}
```

---

```
$this->sender -> sendMessage ($msg) ;
```

```
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---

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    /**
     * @var array<Arg|VariadicPlaceholder> Arguments */
    public $args;

    // Rest of class ...
}
```

---

```
$this->sender -> sendMessage ($msg) ;
```

```
class TextMessageSenderCallerRule
    implements Rule
{
    public function getNodeType() : string
    {
        return MethodCall::class;
    }
}
```

```
class TextMessageSenderCallerRule  
    implements Rule  
{
```

```
    public function getNodeType(): string  
    {  
        return MethodCall::class;  
    }
```

```
class TextMessageSenderCallerRule
    implements Rule
{
    public function getNodeType() : string
    {
        return MethodCall::class;
    }
}
```

```
public function processNode(Node $node, Scope $scope): array  
{
```

```
$callingClass = $scope->getClassReflection()->getName();  
  
if ($callingClass === TextMessageQueueProcessor::class) {  
    return [];  
}  
  
$type = $scope->getType($node->var);  
  
foreach ($type->getReferencedClasses() as $targetClass) {  
    if ($targetClass === TextMessageSender::class) {  
        $msg = "Cant call TextMessageSender from here";  
        return [RuleErrorBuilder::message($msg)->build()];  
    }  
}  
  
return [];  
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
class PersonNotifier
{
    private TextMessageSender $sender;

    public function notifyPlayer(string $msg): void
    {
        $this->sender->sendMessage($msg);
    }
}
```

---

**\$this->sender** is called from **PersonNotifier**

```
class PersonNotifier
{
    private TextMessageSender $sender;

    public function notifyPlayer(string $msg): void
    {
        $this->sender->sendMessage($msg);
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}
```

---

**\$this->sender** is called from **PersonNotifier**

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    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

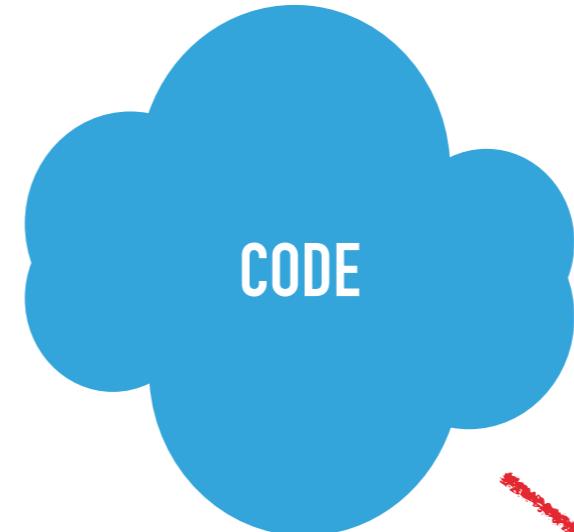
```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

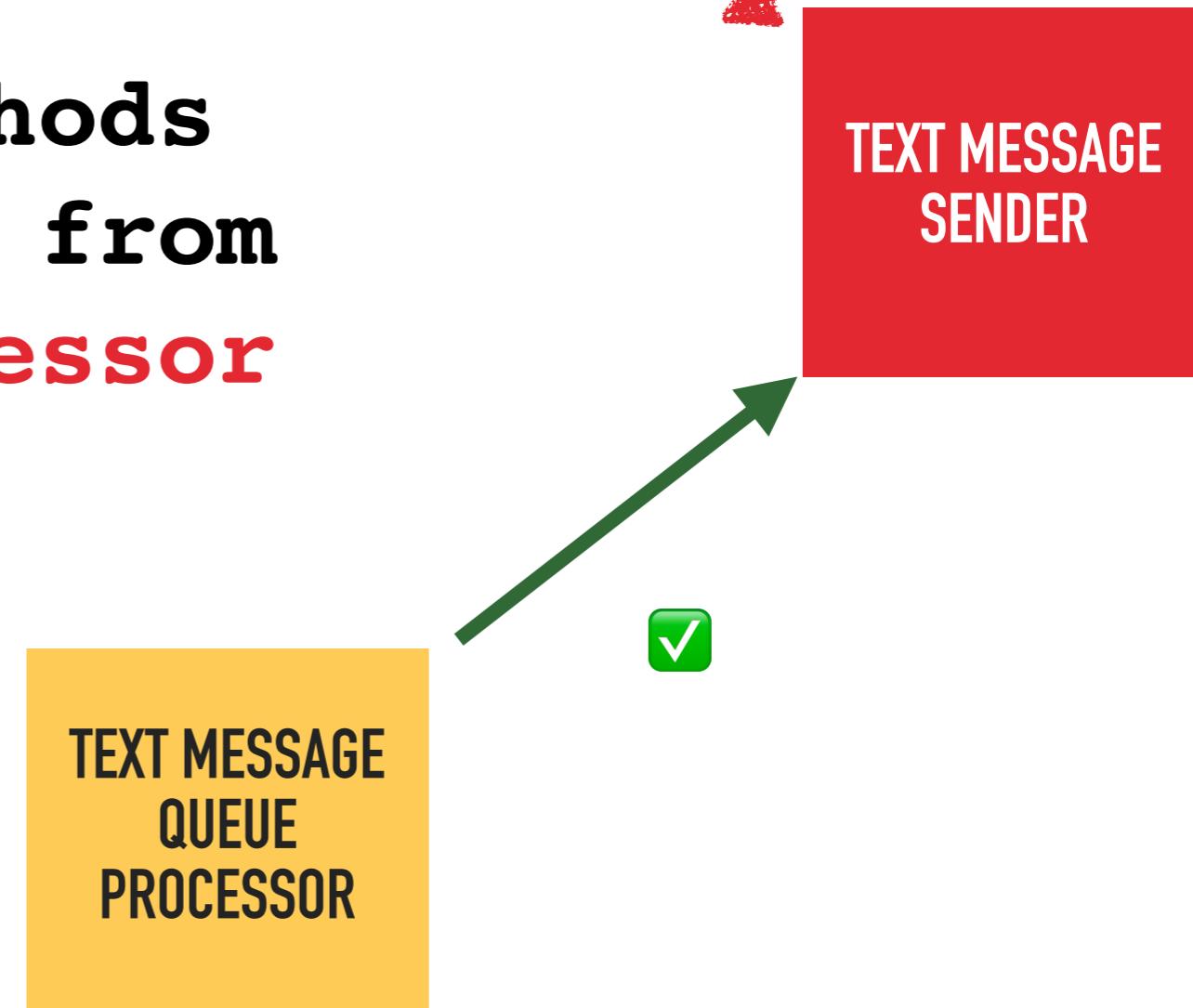
    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```



✗



We can only call methods  
in `TextMessageSender` from  
`TextMessageQueueProcessor`

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

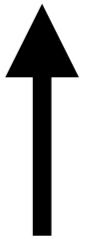
```
$this->sender->notfiyPlayer($msg);
```



var



name



args

```
class PersonNotifier
```

```
{
```

```
    private TextMessageSender $sender;
```

```
    public function notifyPlayer(string $msg): void
```

```
{
```

```
        $this->sender->sendMessage($msg);
```

```
}
```

```
}
```

---

```
$this->sender is of type TextMessageSender
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
class PersonNotifier
{
    private TextMessageSender|WhatsappSender $sender;

    public function notifyPlayer(string $msg): void
    {
        $this->sender->sendMessage($msg);
    }
}
```

---

**\$this->sender** is of type **TextMessageSender**  
or **WhatsappSender**

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

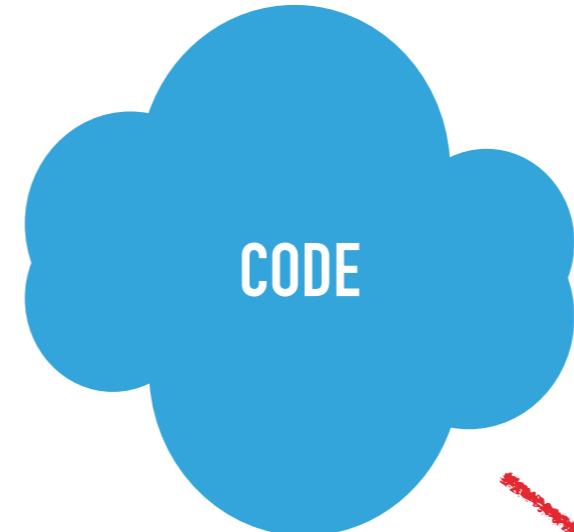
    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

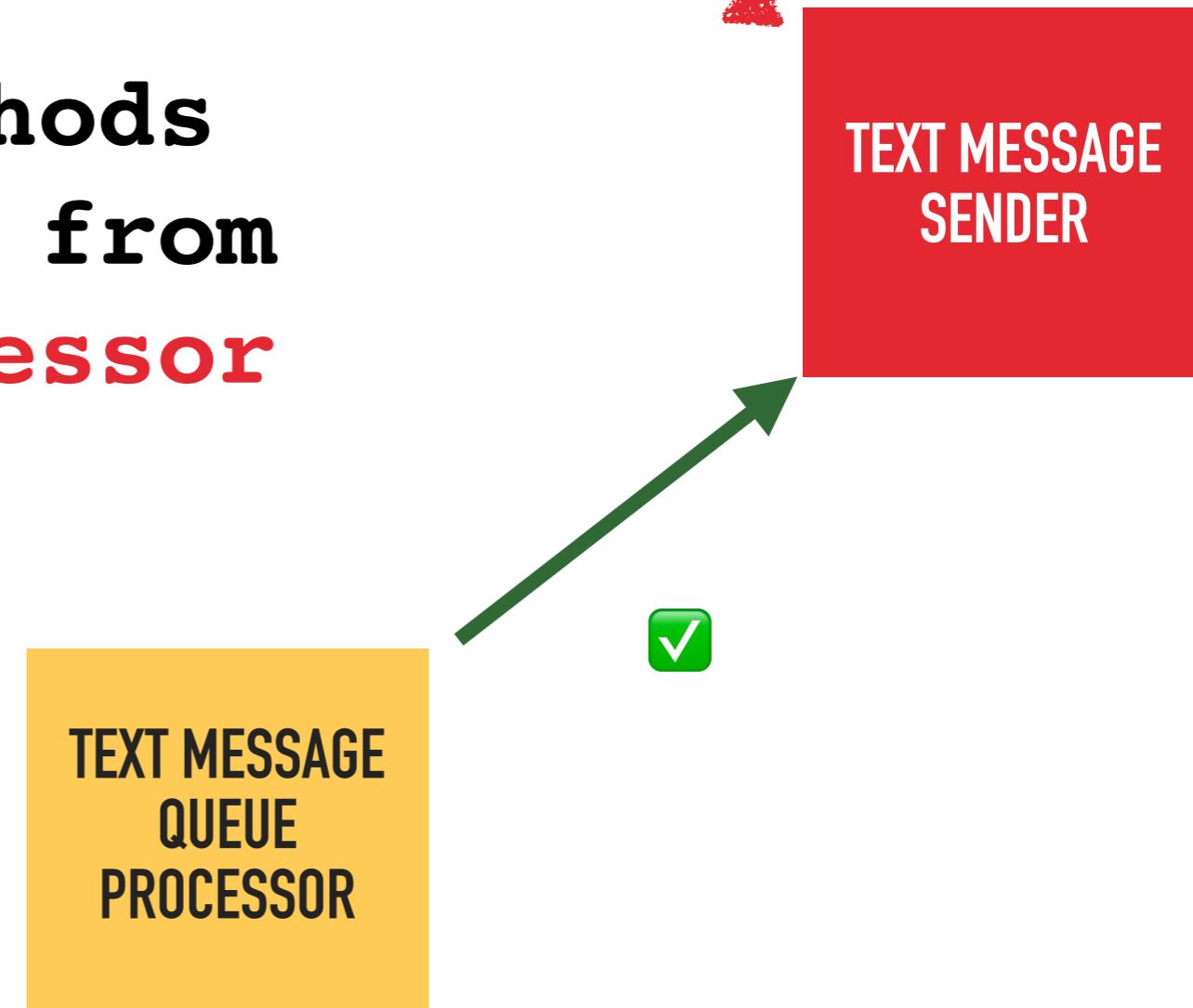
    foreach ($type->getReferencedClasses() as $targetClass) {

        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($message)->build()];
        }
    }

    return [];
}
```



✗



We can only call methods  
in `TextMessageSender` from  
`TextMessageQueueProcessor`

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    // Find the class that method call is in
    $callingClass = $scope->getClassReflection()->getName();

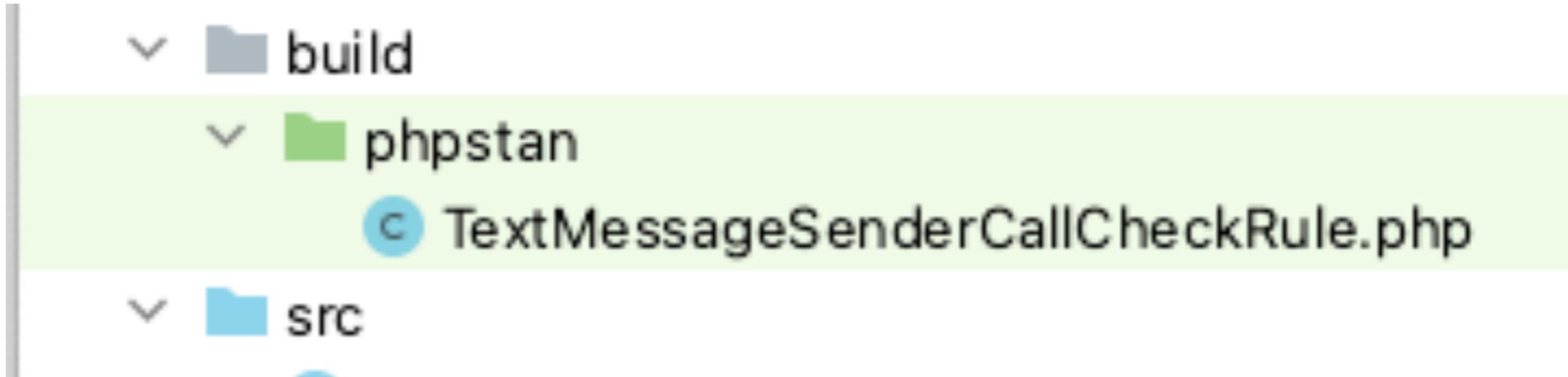
    // If in TextMessageQueueProcessor everything is OK
    if ($callingClass === TextMessageQueueProcessor::class) {
        return [];
    }

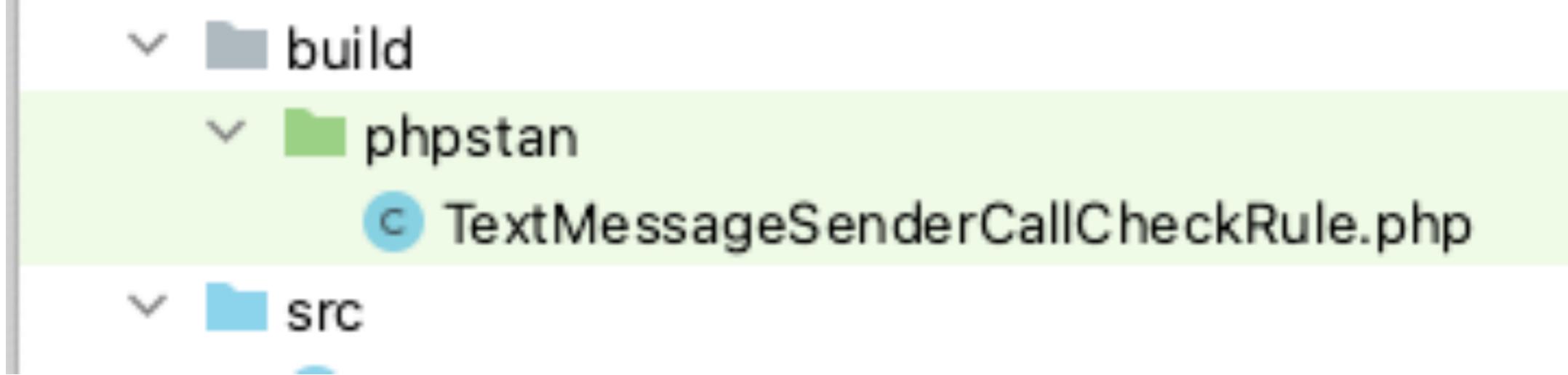
    // Get type of the class of the method call
    $type = $scope->getType($node->var);

    // Iterate through all the possible classes
    foreach ($type->getReferencedClasses() as $targetClass) {

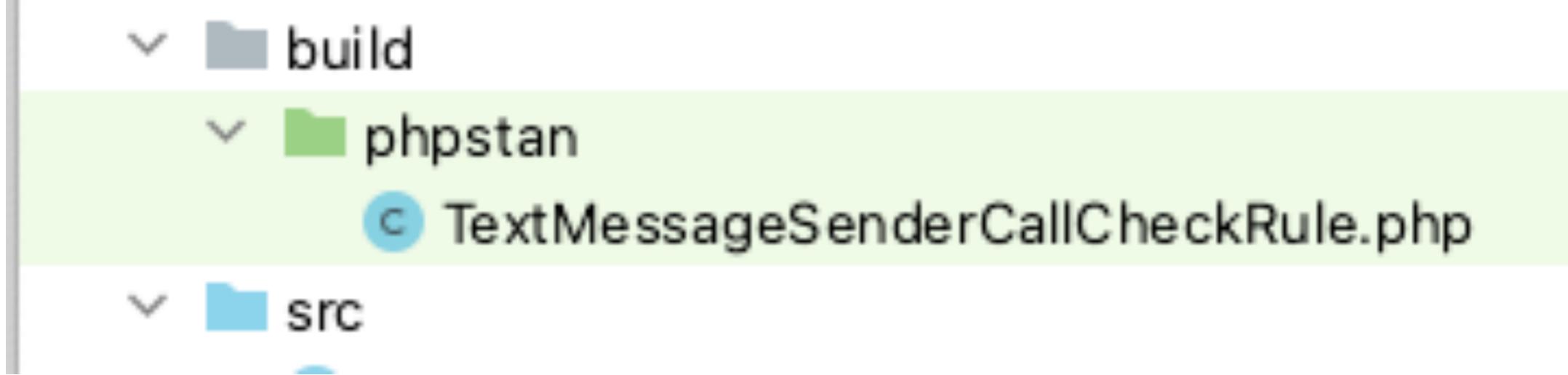
        // Trying to call a method in TextMessageSender? Report error
        if ($targetClass === TextMessageSender::class) {
            $msg = "Cant call TextMessageSender from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    // If we've got this far then there are no errors
    return [];
}
```

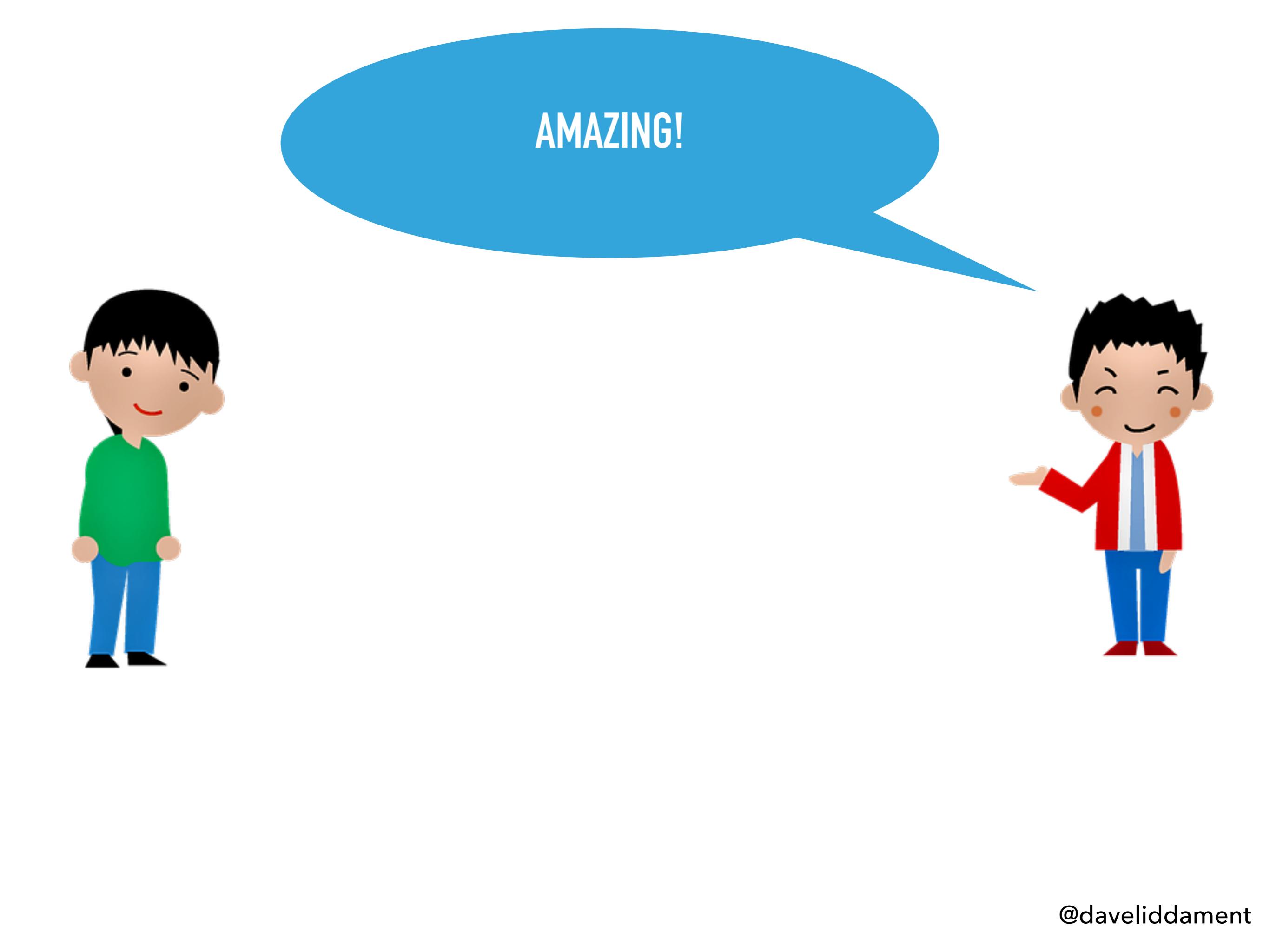




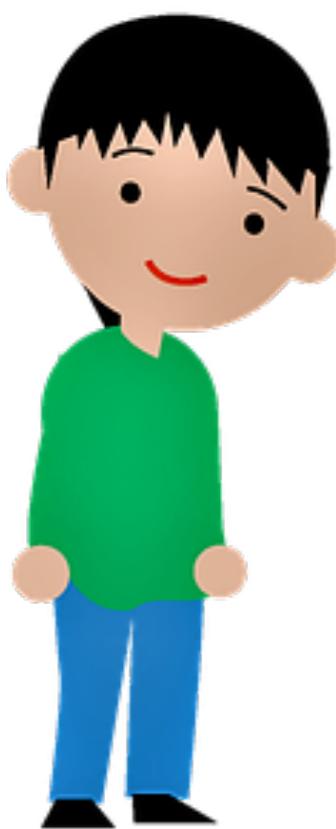
```
"autoload-dev": {  
    "psr-4": {  
        "DaveLiddament\\PhpstanRules\\": "build/phpstan/"  
    }  
},
```

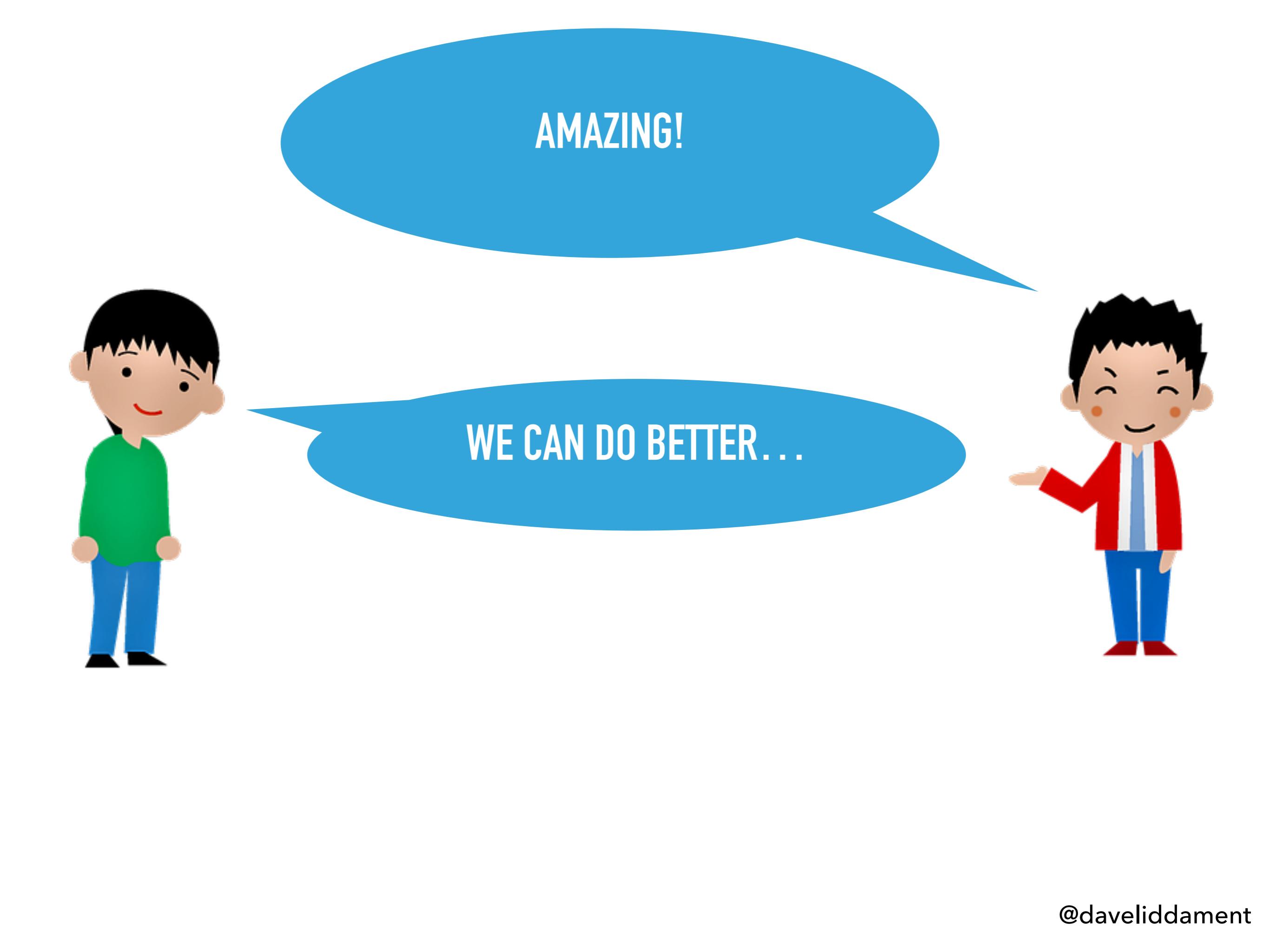


```
"autoload-dev": {  
    "psr-4": {  
        "DaveLiddament\\PhpstanRules\\": "build/phpstan/"  
    }  
},  
  
services:  
-  
    class: DaveLiddament\PhpstanRules\TextMessageSenderCallCheckRule  
    tags:  
    - phpstan.rules.rule
```



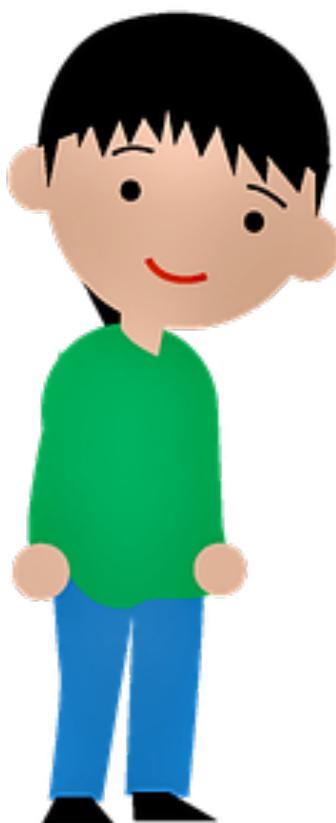
AMAZING!





AMAZING!

WE CAN DO BETTER...



We can only call  
methods in target class  
from a specified  
allowed calling class

```
class TextMessageSenderCallerRule implements Rule
{
```

```
    public function __construct(
        private string $allowedCallingClass,
        private string $targetClass,
    ) {}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === $this->allowedCallingClass) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === $this->targetClass) {
            $msg = "Can not call {$this->targetClass} from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === $this->allowedCallingClass) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === $this->targetClass) {
            $msg = "Can not call {$this->targetClass} from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();

    if ($callingClass === $this->allowedCallingClass) {
        return [];
    }

    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {
        if ($targetClass === $this->targetClass) {
            $msg = "Can not call {$this->targetClass} from here";
            return [RuleErrorBuilder::message($msg)->build()];
        }
    }

    return [];
}
```

**services:**

-

**class: PhpstanRules\TextMessageSenderCallCheckRule**

**tags:**

    - **phpstan.rules.rule**

**arguments:**

**allowedCallingClass: RuleDemo\TextMessageQueueProcessor**

**targetClass: RuleDemo\TextMessageSender**

**services:**

-

**class:** PhpstanRules\TextMessageSenderCallCheckRule

**tags:**

    - phpstan.rules.rule

**arguments:**

**allowedCallingClass:** RuleDemo\TextMessageQueueProcessor

**targetClass:** RuleDemo\TextMessageSender

**services:**

-

**class: PhpstanRules\TextMessageSenderCallCheckRule**

**tags:**

**- phpstan.rules.rule**

**arguments:**

**allowedCallingClass: RuleDemo\TextMessageQueueProcessor**

**targetClass: RuleDemo\TextMessageSender**

**class: PhpstanRules\TextMessageSenderCallCheckRule**

**tags:**

**- phpstan.rules.rule**

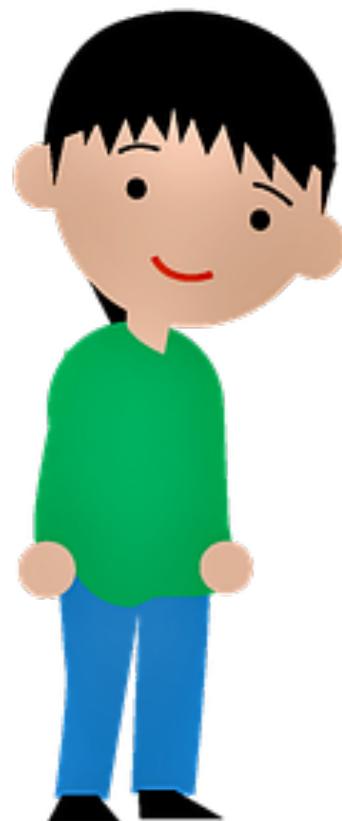
**arguments:**

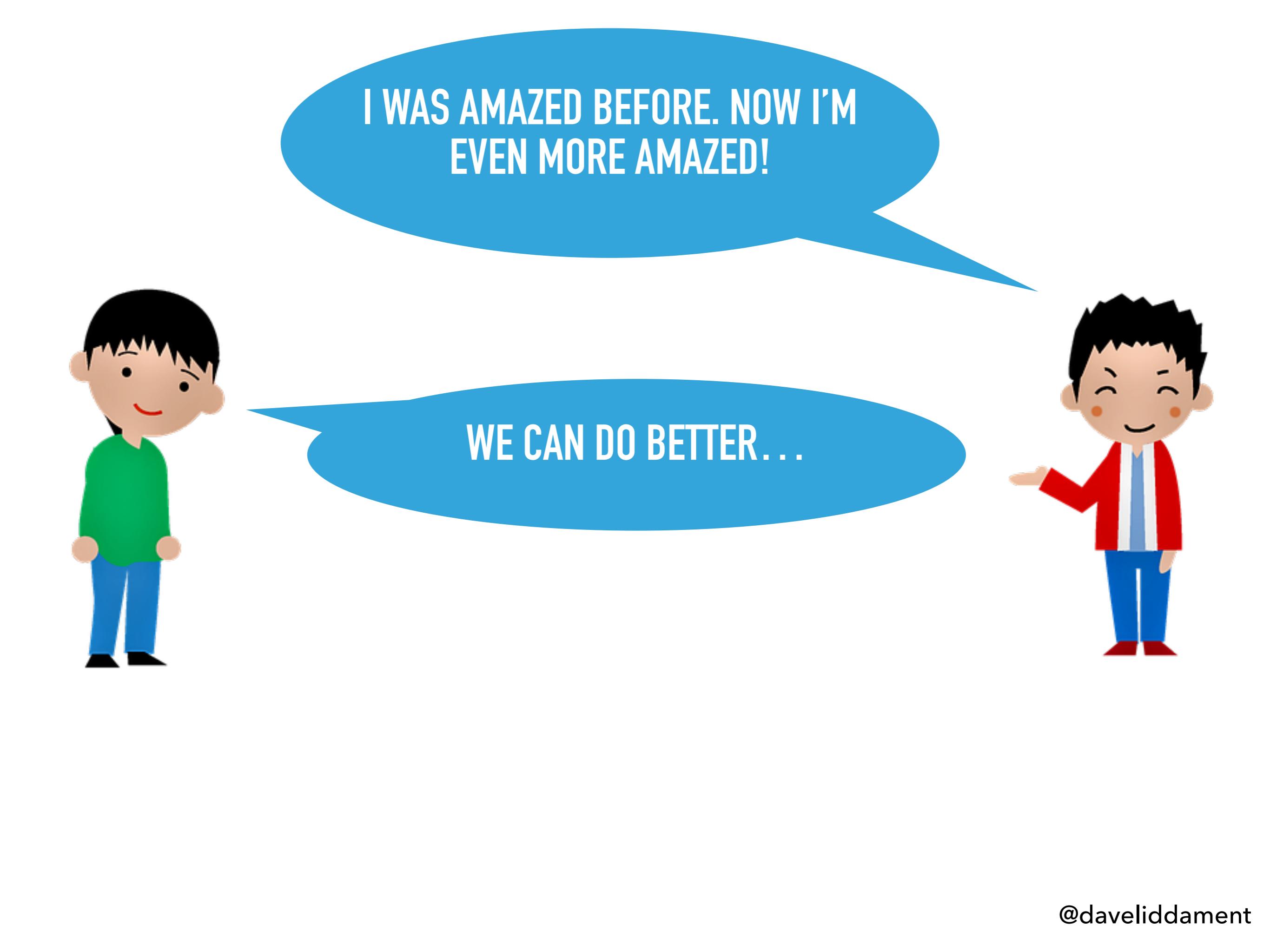
**allowedCallingClass: Foo**

**targetClass: Bar**



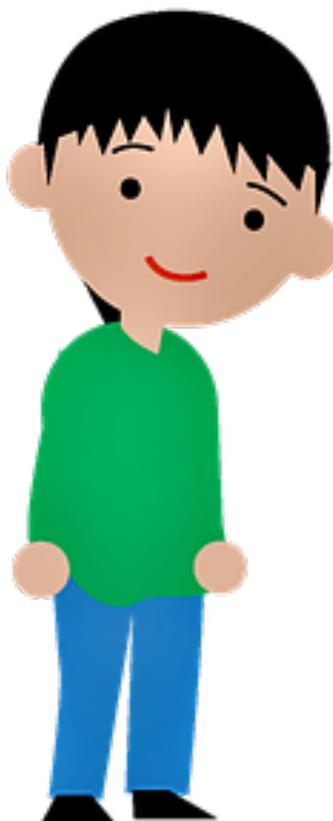
I WAS AMAZED BEFORE. NOW I'M  
EVEN MORE AMAZED!





I WAS AMAZED BEFORE. NOW I'M  
EVEN MORE AMAZED!

WE CAN DO BETTER...



```
/**  
 * Can only be called from TextMessageQueueProcessor  
 */  
class TextMessageSender  
{  
}
```

```
/**  
 * Can only be called from TextMessageQueueProcessor  
 */  
class TextMessageSender  
{  
}  
}
```

```
/**  
 * Can only be called from TextMessageQueueProcessor  
 */  
class TextMessageSender  
{  
}  
}
```

- ▶ Remember to document
- ▶ Remember to setup some config
- ▶ What happens if we rename a class?

```
# [Attribute(Attribute::TARGET_CLASS) ]  
class Friend  
{  
  
    /** @param class-string $friend */  
    public function __construct(  
        public string $friend,  
    ) {}  
}
```

```
# [Attribute(Attribute::TARGET_CLASS) ]
class Friend
{

    /** @param class-string $friend */
    public function __construct(
        public string $friend,
    ) {}

}

#[Friend(TextMessageQueueProcessor::class) ]
class TextMessageSender
{



}
```

```
# [Attribute(Attribute::TARGET_CLASS) ]  
class Friend  
{  
  
    /** @param class-string $friend */  
    public function __construct(  
        public string $friend,  
    ) {}  
}
```

```
# [Friend(TextMessageQueueProcessor::class) ]  
class TextMessageSender  
{  
  
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();
    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {

        // TODO:
        // 1. Does $targetClass have a #[Friend] attribute
        // 2. Yes? Check $callingClass is a friend of $targetClass
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();
    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {

        // TODO:
        // 1. Does $targetClass have a #[Friend] attribute
        // 2. Yes? Check $callingClass is a friend of $targetClass
    }

    return [];
}
```

```
public function processNode(Node $node, Scope $scope): array
{
    $callingClass = $scope->getClassReflection()->getName();
    $type = $scope->getType($node->var);

    foreach ($type->getReferencedClasses() as $targetClass) {

        // TODO:
        // 1. Does $targetClass have a #[Friend] attribute
        // 2. Yes? Check $callingClass is a friend of $targetClass
    }

    return [];
}
```

```
class TextMessageSenderCallerRule implements Rule
{
    public function __construct(
        private ReflectionProvider $reflectionProvider,
    ) {}
}
```

```
foreach ($type->getReferencedClasses() as $targetClass) {  
  
    // 1. Does $targetClass have a #[Friend] attribute  
  
    $info = $this->reflectionProvider->getClass($targetClass);  
  
    $nativeReflection = $info->getNativeReflection();  
  
    $friendAttributes = $nativeReflection  
        ->getAttributes(Friend::class);  
  
    if (count($friendAttributes) !== 1) {  
        continue;  
    }  
  
    $friendAttribute = $friendAttributes[0];  
    $friendArguments = $friendAttribute->getArguments();  
  
    if (count($friendArguments) !== 1) {  
        continue;  
    }  
  
    $friendClass = $friendArguments[0];
```

```
foreach ($type->getReferencedClasses() as $targetClass) {  
  
    // 1. Does $targetClass have a #[Friend] attribute  
  
    $info = $this->reflectionProvider->getClass($targetClass);  
  
    $nativeReflection = $info->getNativeReflection();  
  
    $friendAttributes = $nativeReflection  
        ->getAttributes(Friend::class);  
  
    if (count($friendAttributes) !== 1) {  
        continue;  
    }  
  
    $friendAttribute = $friendAttributes[0];  
    $friendArguments = $friendAttribute->getArguments();  
  
    if (count($friendArguments) !== 1) {  
        continue;  
    }  
  
    $friendClass = $friendArguments[0];
```

```
foreach ($type->getReferencedClasses() as $targetClass) {  
  
    // 1. Does $targetClass have a #[Friend] attribute  
  
    $info = $this->reflectionProvider->getClass($targetClass);  
  
    $nativeReflection = $info->getNativeReflection();  
  
    $friendAttributes = $nativeReflection  
        ->getAttributes(Friend::class);  
  
    if (count($friendAttributes) !== 1) {  
        continue;  
    }  
  
    $friendAttribute = $friendAttributes[0];  
    $friendArguments = $friendAttribute->getArguments();  
  
    if (count($friendArguments) !== 1) {  
        continue;  
    }  
  
    $friendClass = $friendArguments[0];
```

```
foreach ($type->getReferencedClasses() as $targetClass) {  
  
    // 1. Does $targetClass have a #[Friend] attribute  
  
    $info = $this->reflectionProvider->getClass($targetClass);  
  
    $nativeReflection = $info->getNativeReflection();  
  
    $friendAttributes = $nativeReflection  
        ->getAttributes(Friend::class);  
  
    if (count($friendAttributes) !== 1) {  
        continue;  
    }  
  
    $friendAttribute = $friendAttributes[0];  
    $friendArguments = $friendAttribute->getArguments();  
  
    if (count($friendArguments) !== 1) {  
        continue;  
    }  
  
    $friendClass = $friendArguments[0];
```

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foreach ($type->getReferencedClasses() as $targetClass) {  
  
    // 1. Does $targetClass have a #[Friend] attribute  
  
    $info = $this->reflectionProvider->getClass($targetClass);  
  
    $nativeReflection = $info->getNativeReflection();  
  
    $friendAttributes = $nativeReflection  
        ->getAttributes(Friend::class);  
  
    if (count($friendAttributes) !== 1) {  
        continue;  
    }  
  
    $friendAttribute = $friendAttributes[0];  
    $friendArguments = $friendAttribute->getArguments();  
  
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        continue;  
    }  
  
    $friendClass = $friendArguments[0];
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foreach ($type->getReferencedClasses() as $targetClass) {  
  
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    $info = $this->reflectionProvider->getClass($targetClass);  
  
    $nativeReflection = $info->getNativeReflection();  
  
    $friendAttributes = $nativeReflection  
        ->getAttributes(Friend::class);  
  
    if (count($friendAttributes) !== 1) {  
        continue;  
    }  
  
    $friendAttribute = $friendAttributes[0];  
    $friendArguments = $friendAttribute->getArguments();  
  
    if (count($friendArguments) !== 1) {  
        continue;  
    }  
  
    $friendClass = $friendArguments[0];
```

```
foreach ($type->getReferencedClasses() as $targetClass) {  
  
    // Step 1 see previous slide  
  
    // 2. Yes? Check $callingClass is a friend of $targetClass  
  
    if ($callingClass !== $friendClass) {  
  
        $msg = sprintf(  
            "%s can only be called its friend %s and not from %s",  
            $targetClass,  
            $friendClass,  
            $callingClass);  
  
        return [RuleErrorBuilder::message($msg)->build()];  
    }  
}
```

```
foreach ($type->getReferencedClasses() as $targetClass) {  
  
    // Step 1 see previous slide  
  
    // 2. Yes? Check $callingClass is a friend of $targetClass  
  
    if ($callingClass !== $friendClass) {  
  
        $msg = sprintf(  
            "%s can only be called its friend %s and not from %s",  
            $targetClass,  
            $friendClass,  
            $callingClass);  
  
        return [RuleErrorBuilder::message($msg)->build()];  
    }  
}  
}
```

```
#[Attribute(Attribute::TARGET_CLASS)]
class Friend
{
    /** @param class-string $friend */
    public function __construct(
        public string $friend,
    ) {}
}
```

```

class TextMessageSenderCallCheckRule implements Rule
{
    public function __construct(
        private ReflectionProvider $reflectionProvider,
    ) {}

    public function getNodeType(): string
    {
        return MethodCall::class;
    }

    public function processNode(Node $node, Scope $scope): array
    {
        $callingClass = $scope->getClassReflection()->getName();
        $type = $scope->getType($node->var);

        foreach ($type->getReferencedClasses() as $targetClass) {
            $nativeReflection = $this->reflectionProvider->getClass($targetClass)->getNativeReflection();
            $friendAttributes = $nativeReflection->getAttributes(Friend::class);
            if (count($friendAttributes) !== 1) {
                continue;
            }

            $friendAttribute = $friendAttributes[0];
            $friendArguments = $friendAttribute->getArguments();
            if (count($friendArguments) !== 1) {
                continue;
            }

            $friend = $friendArguments[0];
            if ($callingClass !== $friend) {
                $msg = sprintf("Can not call %s from %s", $targetClass, $callingClass);
                return [RuleErrorBuilder::message($msg)->build()];
            }
        }

        return [];
    }
}

#[Attribute(Attribute::TARGET_CLASS)]
class Friend
{
    /** @param class-string $friend */
    public function __construct(
        public string $friend,
    ) {}

}

```

```

class TextMessageSenderCallCheckRule implements Rule
{
    public function __construct(
        private ReflectionProvider $reflectionProvider,
    ) {}

    public function getNodeType(): string
    {
        return MethodCall::class;
    }

    public function processNode(Node $node, Scope $scope): array
    {
        $callingClass = $scope->getClassReflection()->getName();
        $type = $scope->getType($node->var);

        foreach ($type->getReferencedClasses() as $targetClass) {
            $nativeReflection = $this->reflectionProvider->getClass($targetClass)->getNativeReflection();
            $friendAttributes = $nativeReflection->getAttributes(Friend::class);
            if (count($friendAttributes) !== 1) {
                continue;
            }

            $friendAttribute = $friendAttributes[0];
            $friendArguments = $friendAttribute->getArguments();
            if (count($friendArguments) !== 1) {
                continue;
            }

            $friend = $friendArguments[0];
            if ($callingClass !== $friend) {
                $msg = sprintf("Can not call %s from %s", $targetClass, $callingClass);
                return [RuleErrorBuilder::message($msg)->build()];
            }
        }
    }
}

```

```

#[Attribute(Attribute::TARGET_CLASS)]
class Friend
{
    /** @param class-string $friend */
    public function __construct(
        public string $friend,
    ) {}

}

```

<https://github.com/DaveLiddament/phpstan-rule-demo>

```
class TextMessageSenderCallCheckRule implements Rule
{
    public function __construct(
        private ReflectionProvider $reflectionProvider,
        private string $targetClass
    ) {}

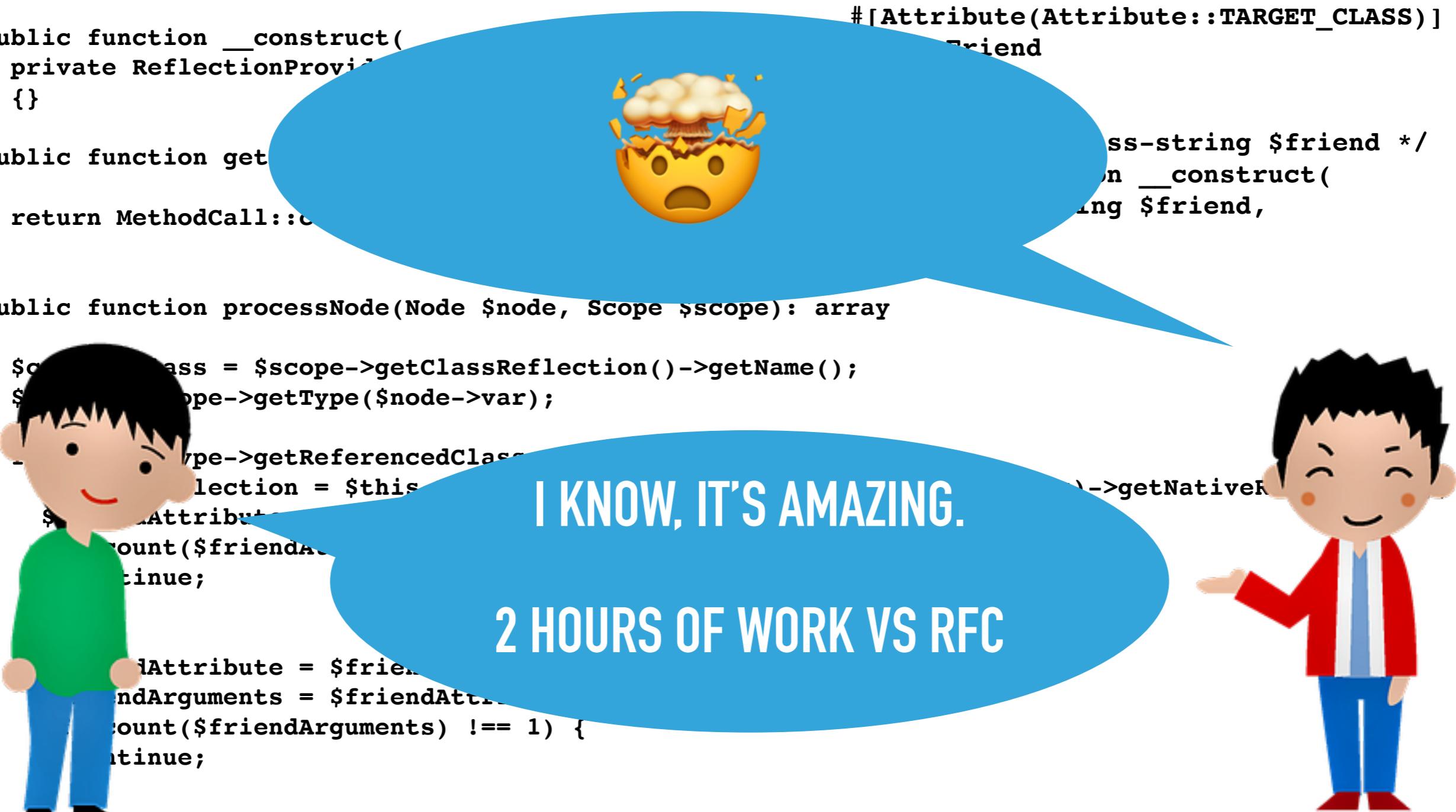
    public function getMethodCalls(): array
    {
        return MethodCall::create(
            $this->getReflectionProvider()
                ->getNativeReflection($targetClass)
                ->getNativeMethodCalls()
        );
    }

    public function processNode(Node $node, Scope $scope): array
    {
        $callingClass = $scope->getClassReflection()->getName();
        $callingType = $scope->getType($node->var);

        if ($callingType->getReferencedClasses() && $callingType->getReferencedClasses()->count() === 1) {
            $targetClass = $callingType->getReferencedClasses()[0];
            $targetReflection = $this->getReflectionProvider()
                ->getNativeReflection($targetClass);
            $targetType = $targetReflection->getType('friend');
            $targetAttributes = $targetType->getAttributes();

            foreach ($targetAttributes as $attribute) {
                if ($attribute->isPublic()) {
                    continue;
                }
            }
        }

        $friendArguments = $node->args;
        if ($friendArguments->count() === 1) {
            $friend = $friendArguments[0];
            if ($callingClass !== $friend) {
                $msg = sprintf("Can not call %s from %s", $targetClass, $callingClass);
                return [RuleErrorBuilder::message($msg)->build()];
            }
        }
    }
}
```



# [Attribute(Attribute::TARGET\_CLASS)]  
Friend  
class TextMessageSenderCallCheckRule implements Rule  
{  
 public function \_\_construct(  
 private ReflectionProvider \$reflectionProvider,  
 private string \$targetClass  
 ) {}  
  
 public function getMethodCalls(): array  
 {  
 return MethodCall::create(  
 \$this->getReflectionProvider()  
 ->getNativeReflection(\$targetClass)  
 ->getNativeMethodCalls()  
 );  
 }  
  
 public function processNode(Node \$node, Scope \$scope): array  
 {  
 \$callingClass = \$scope->getClassReflection()->getName();  
 \$callingType = \$scope->getType(\$node->var);  
  
 if (\$callingType->getReferencedClasses() && \$callingType->getReferencedClasses()->count() === 1) {  
 \$targetClass = \$callingType->getReferencedClasses()[0];  
 \$targetReflection = \$this->getReflectionProvider()  
 ->getNativeReflection(\$targetClass);  
 \$targetType = \$targetReflection->getType('friend');  
 \$targetAttributes = \$targetType->getAttributes();  
  
 foreach (\$targetAttributes as \$attribute) {  
 if (\$attribute->isPublic()) {  
 continue;  
 }  
 }  
  
 \$friendArguments = \$node->args;  
 if (\$friendArguments->count() === 1) {  
 \$friend = \$friendArguments[0];  
 if (\$callingClass !== \$friend) {  
 \$msg = sprintf("Can not call %s from %s", \$targetClass, \$callingClass);  
 return [RuleErrorBuilder::message(\$msg)->build()];  
 }  
 }  
 }  
 }  
}

<https://github.com/DaveLiddament/phpstan-rule-demo>

# **Custom Static Analysis Rules**

**+**

## **Attributes**

**=**

## **New Language Features**

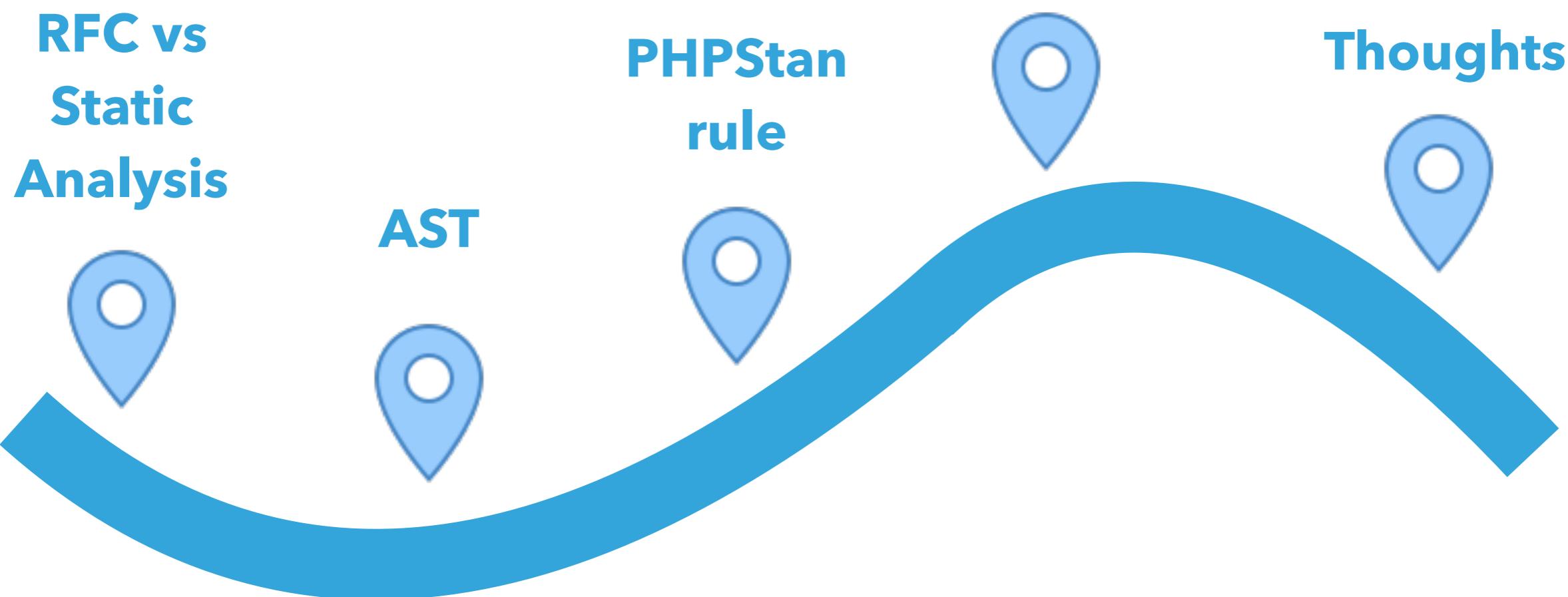
**RFC vs  
Static  
Analysis**

**AST**

**PHPStan  
rule**

**PHP Extension  
Library**

**Thoughts**



[main](#) [1 branch](#) [3 tags](#)[Go to file](#)[Add file](#)[Code](#)

 DaveLiddament Merge pull request #6 from DaveLiddament/fix/test-tag-attrib...	...	aa2f632 8 days ago	22 commits
 .github/workflows	FIX remove unused section of github actions	2 months ago	
 examples	ADD InjectableVersion Attribute	9 days ago	
 src	FIX copy and paste error with TestTag	8 days ago	
 .gitignore	ADD linting, coding standards and phpstan	2 months ago	
 .php-cs-fixer.php	ADD linting, coding standards and phpstan	2 months ago	
 CONTRIBUTING.md	ADD contributing notes and update example code	2 months ago	
 LICENSE.md	INITIAL CHECK IN	2 months ago	
 README.md	ADD InjectableVersion Attribute	9 days ago	
 composer.json	ADD keywords to composer.json	2 months ago	
 composer.lock	ADD psalm	2 months ago	
 phpstan.neon	UPDATE Friend and Sealed to use variadic for friends/permited	2 months ago	
 psalm.xml	ADD psalm	2 months ago	

[README.md](#)

## PHP Language Extensions (currently in BETA)

This library provides attributes for extending the PHP language (e.g. adding `package` visibility). The intention, at least initially, is that these extra language features are enforced by static analysis tools (such as Psalm, PHPStan and, ideally, PhpStorm) and NOT at runtime.

### Language feature added:

- [Friend](#)
- [InjectableVersion](#)
- [Package](#)
- [Sealed](#)
- [TestTag](#)

### About

Attributes to define PHP language extensions (to be enforced by static analysis)

[Readme](#)[MIT license](#)[16 stars](#)[2 watching](#)[1 fork](#)

### Releases 3

[0.2.1 Latest](#)  
8 days ago[+ 2 releases](#)

### Packages

No packages published  
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### Contributors 2

 [DaveLiddament](#) Dave Liddament [ruudk](#) Ruud Kamphuis

### Languages

 PHP 100.0%

**<https://github.com/DaveLiddament/php-language-extensions>**

[main](#) [1 branch](#) [3 tags](#)[Go to file](#)[Add file](#)[Code](#)[About](#)

Attributes to define PHP language  
extensions (to be enforced by static

DaveLiddament Merge pull request #6 from DaveLiddament/fix/test-tag-attrib...

aa2f632 8 days ago 22 commits

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[README.md](#)

## PHP Language Extensions (currently in Beta)

This library provides attributes for extending the PHP language (e.g. adding `package`, `friend`, etc). The main benefit, at least initially, is that these extra language features are enforced by static analysis tools (such as Psalm, PHPStan, and, ideally, PhpStorm) and NOT at runtime.

Language feature added:

- [Friend](#)
- [InjectableVersion](#)
- [Package](#)
- [Sealed](#)
- [TestTag](#)



# [Friend]  
#[Package]  
#[InjectableVersion]  
#[TestTag]  
#[Sealed]

**<https://github.com/DaveLiddament/php-language-extensions>**

# Definition

**<https://github.com/DaveLiddament/php-language-extensions>**

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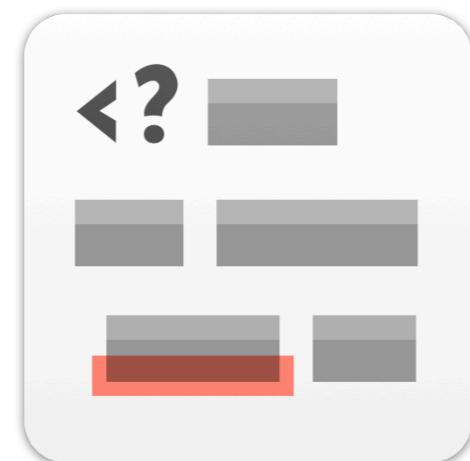
**<https://github.com/DaveLiddament/phpstan-php-language-extensions>**

# Definition

<https://github.com/DaveLiddament/php-language-extensions>



<https://github.com/DaveLiddament/phpstan-php-language-extensions>



# # [Friend]

Only allowed to  
call method from  
specified classes

```
● ● ●

class Person
{
    #[Friend(PersonBuilder::class)]
    public function __construct()
    {...}

}

class PersonBuilder
{
    public function create(): Person {
        return new Person();
    }
}

class AnotherClass
{
    public function doSomething() {
        $person = new Person();
    }
}
```

# # [Friend]



```
class Person
{
    #[Friend(PersonBuilder::class)]
    public function __construct()
    {
        ...
    }

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# # [Friend]



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            return new Person();
        }
    }

    class AnotherClass
    {
        public function doSomething()
        {
            $person = new Person(); X
        }
    }
}
```



# #**[Package]**

Only allowed  
to call methods  
from the same  
namespace

```
namespace ShoppingBasket;

class PriceCalculator {
    public function calculatePrice(): Money {
        // Some code
        DiscountCaluclator::getDiscount($items);
    }
}

class DiscountCalculator {
    #[Package]
    public static function getDiscount($items) {
        // Some code
        return $discount;
    }
}
```



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        return $discount;
    }
}
```



```
namespace SomeNamespace;

class SomeClass {
    public function SomeMethod( ) {
        // Some code
        DiscountCaluclator::getDiscount($items);
    }
}
```



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```

# #[TestTag]

```
● ● ●  
class Person  
{  
    #[TestTag]  
    public function setId(int $id) {  
        $this->id = $id;  
    }  
}  
  
function updatePerson(Person $person) {  
    $person->setId(3);  
}  
  
// Tests  
class MyTest  
{  
    public function testSomething() {  
        $person = new Person();  
        $person->setId(6);  
    }  
}
```

# #[TestTag]

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Only allowed to  
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function updatePerson(Person $person) {
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# ##[InjectableVersion]

If the class hierarchy contains an interface or class with this attribute only that version maybe injected into constructors

```
##[InjectableVersion]
interface Emailer {
    public function sendEmail();
}

class PhpMailer implements Emailer {
    public function sendEmail()
    { ... }
}

class SignupService {
    public function __construct(
        public Emailer $emailer,
    ) {}
}

class MarketingService {
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class MarketingService {
    public function __construct(
        public PhpMailer $emailer, X
    ) {}
}
```

# Attributes

**<https://github.com/DaveLiddament/php-language-extensions>**

# PHPStan

**<https://github.com/DaveLiddament/phpstan-php-language-extensions>**

# Psalm and others

**Contributions welcome**

# <https://github.com/DaveLiddament/php-language-extensions>

- ✓  examples
  - >  callableFrom
  - >  friend
  - >  injectableVersion
  - >  namespaceVisibility
  - >  package
  - >  sealed
  - ✓  testTag
    -  testTagOnConstructor.php
    -  testTagOnConstructorIgnoredInTestClass.php
    -  testTagOnConstructorIgnoredInTestNamespace.php
    -  testTagOnMethod.php
    -  testTagOnMethodIgnoredInTestClass.php
    -  testTagOnMethodIgnoredInTestNamespace.php
    -  testTagOnStaticMethod.php
    -  testTagOnStaticMethodIgnoredInTestClass.php
    -  testTagOnStaticMethodIgnoredInTestNamespace.php
- ✓  src
  -  CallableFrom.php
  -  CheckInjectableVersion.php

# <https://github.com/DaveLiddament/php-language-extensions>

```
<ul style="list-style-type: none;">- <ul style="list-style-type: none;">- > examples
- > callableFrom
- > friend
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-  testTagOnConstructorIgnoredInTestClass.php
-  testTagOnConstructorIgnoredInTestNamespace.php
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-  testTagOnMethodIgnoredInTestClass.php
-  testTagOnMethodIgnoredInTestNamespace.php
-  testTagOnStaticMethod.php
-  testTagOnStaticMethodIgnoredInTestClass.php
-  testTagOnStaticMethodIgnoredInTestNamespace.php

```

```
<ul style="list-style-type: none;">- > src
-  CallableFrom.php
-  CheckInjectableVersion.php

```

# <https://github.com/DaveLiddament/php-language-extensions>

```
examples
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    ├── testTagOnMethod.php
    ├── testTagOnMethodIgnoredInTestClass.php
    ├── testTagOnMethodIgnoredInTestNamespace.php
    ├── testTagOnStaticMethod.php
    ├── testTagOnStaticMethodIgnoredInTestClass.php
    └── testTagOnStaticMethodIgnoredInTestNamespace.php
```

```
src
├── CallableFrom.php
└── CheckInjectableVersion.php
```

# <https://github.com/DaveLiddament/php-language-extensions>

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  > callableFrom
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  > injectableVersion
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▽ src
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  C CheckInjectableVersion.php
```

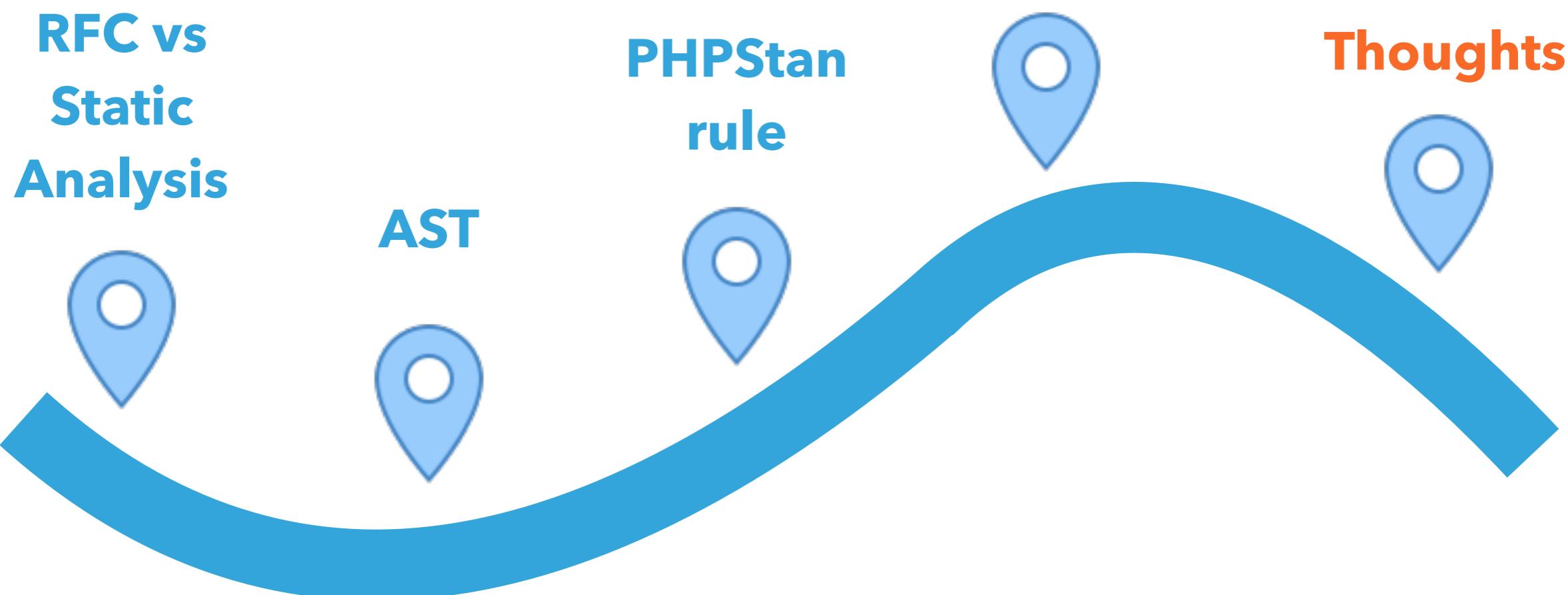
**RFC vs  
Static  
Analysis**

**AST**

**PHPStan  
rule**

**PHP Extension  
Library**

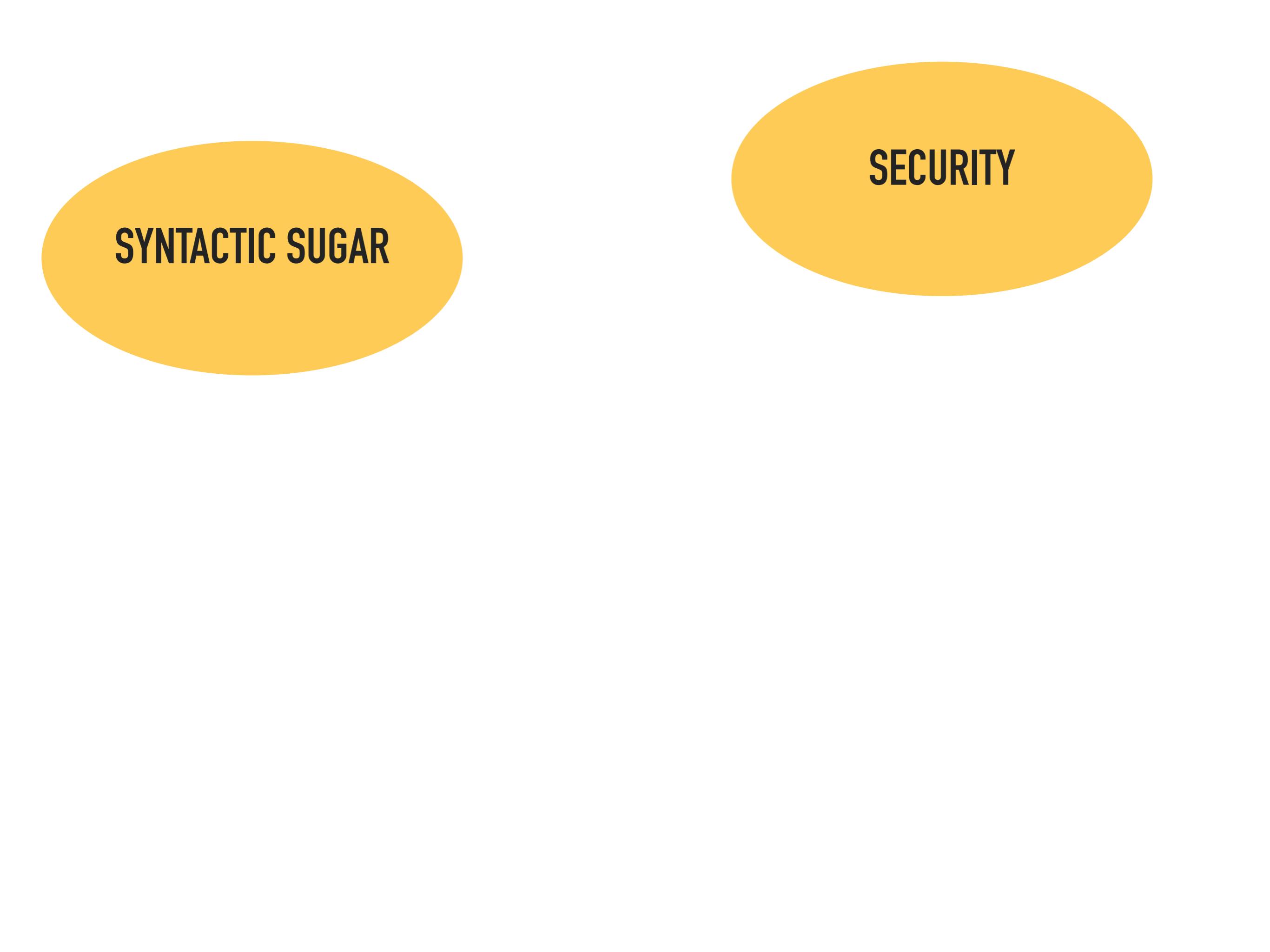
**Thoughts**





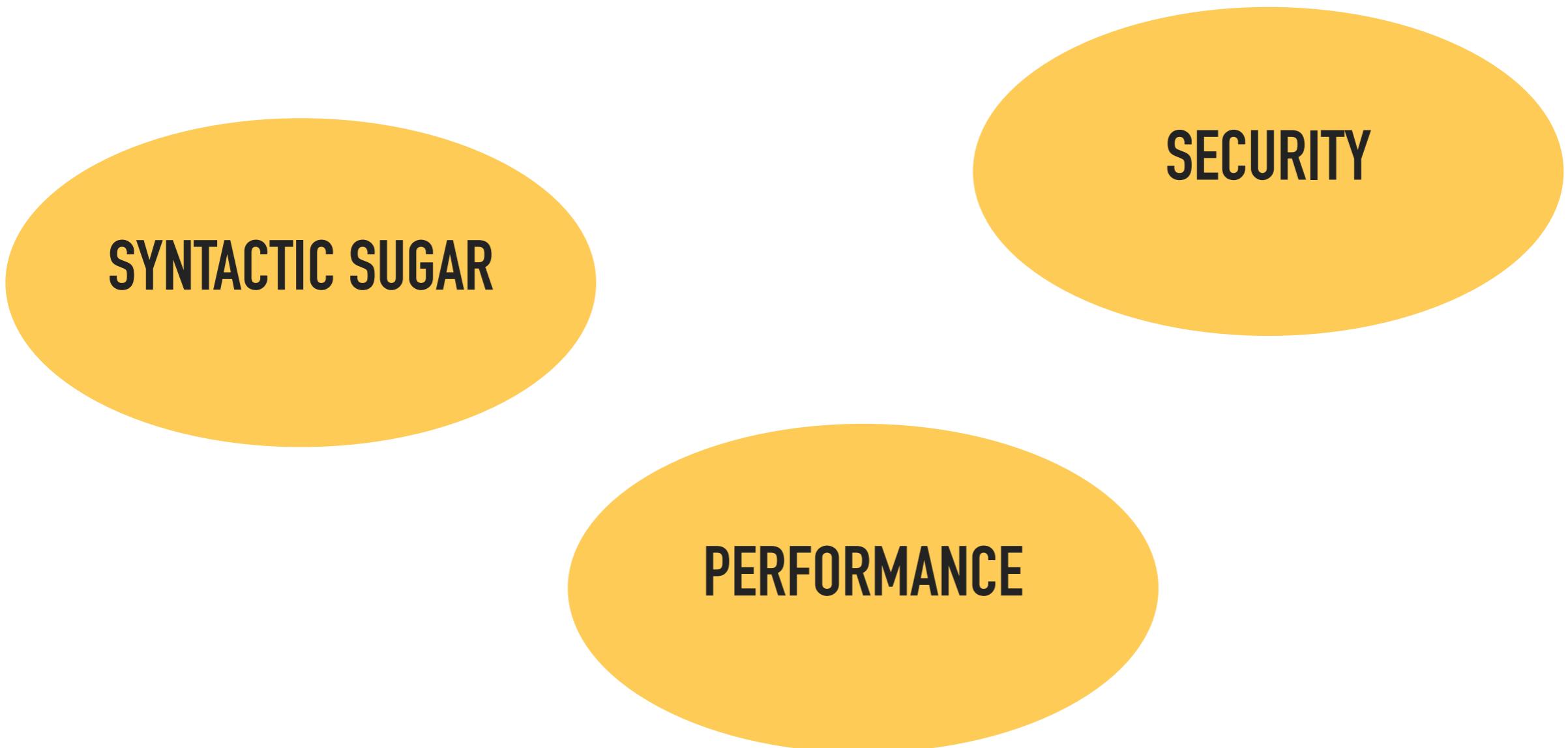


**SECURITY**



**SYNTACTIC SUGAR**

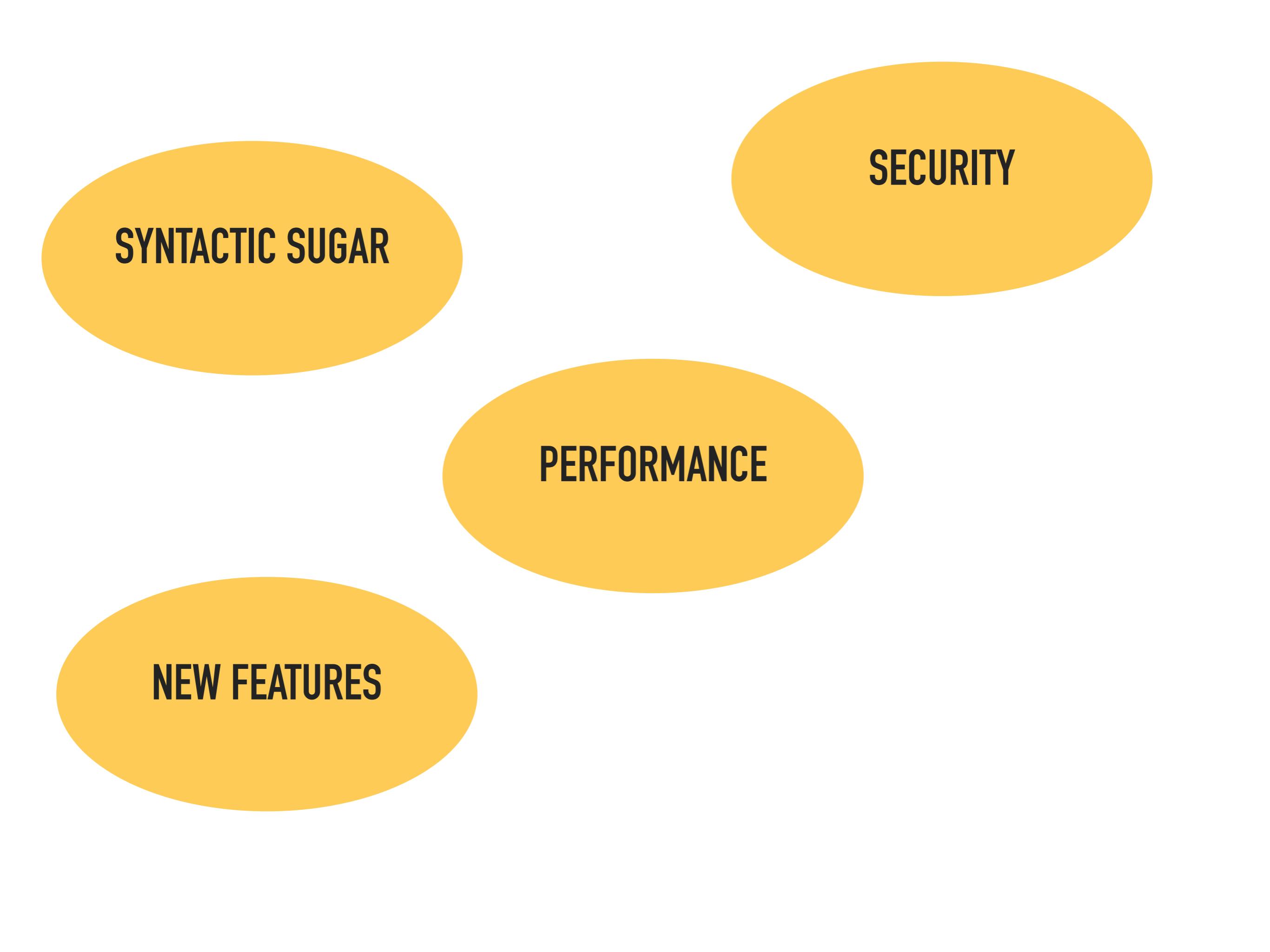
**SECURITY**



**SYNTACTIC SUGAR**

**SECURITY**

**PERFORMANCE**



**SYNTACTIC SUGAR**

**SECURITY**

**PERFORMANCE**

**NEW FEATURES**

**SYNTACTIC SUGAR**

**SECURITY**

**PERFORMANCE**

**NEW FEATURES**

**COMMUNICATING  
INTENTION**

**SYNTACTIC SUGAR**

**SECURITY**

**PERFORMANCE**

**NEW FEATURES**

**COMMUNICATING  
INTENTION**

**OVERLAP**

**SYNTACTIC SUGAR**

**SECURITY**

**PERFORMANCE**

**NEW FEATURES**

**COMMUNICATING  
INTENTION**

**public**

**protected**

**private**

**final**

**abstract**

**readonly**

**type declarations**

**type hints**

**public**

**protected**

**private**

**final**

**abstract**

**readonly**

**type declarations**

**type hints**



**public**

**protected**

**private**

**type declarations**

**type hints**



**final**

**abstract**

**readonly**

**Friend**

**Sealed**

**Package**

**InjectableVersion**

**public**

**protected**

**private**

**final**

**abstract**

**readonly**

**type declarations**

**Friend**

**type hints**

**Sealed**

**Package**

**InjectableVersion**



**AUTOMATE CHECKS FOR VIOLATIONS**

# Try out ideas...

Today

```
# [Friend(TextMessageQueueProcessor::class)]  
class TextMessageSender  
{  
}  
}
```

# Try out ideas...

Today

```
# [Friend(TextMessageQueueProcessor::class)]  
class TextMessageSender  
{
```

}

PHP 8.3+ ?

```
class TextMessageSender  
    friend TextMessageQueueProcessor  
{  
  
}
```

# Try out ideas...

Today

```
# [Friend(TextMessageQueueProcessor::class)]  
class TextMessageSender  
{
```

}

PHP 8.3+ ?

```
class TextMessageSender  
    friend TextMessageQueueProcessor
```

{

}

never return type (added in PHP 8.1)

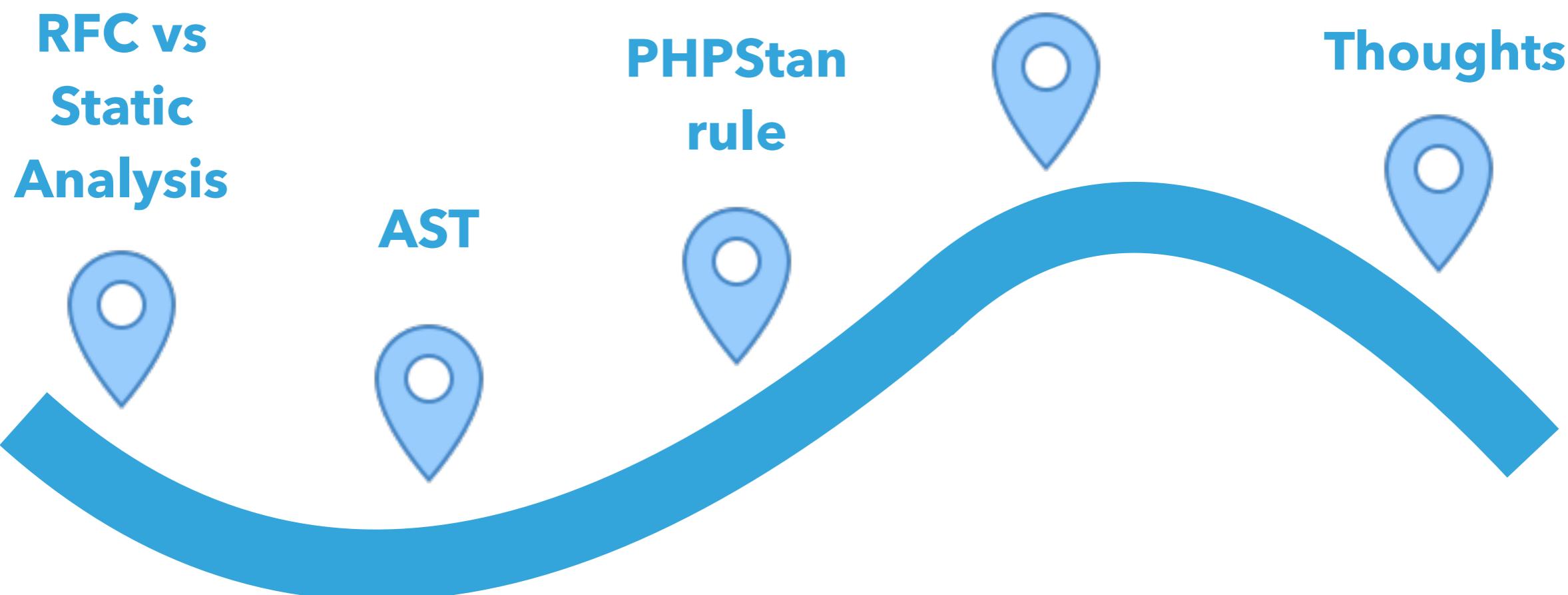
**RFC vs  
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**PHPStan  
rule**

**PHP Extension  
Library**

**Thoughts**



# Custom static analysis rules allows developers to:

- ▶ automatically enforce project conventions
- ▶ create new language features

# Thank you for listening



Dave Liddament

@daveliddament

# Further information

<https://phpstan.org/developing-extensions/rules>

