PHP 8.1 Enums

Ayesh Karunaratne | https://aye.sh/talk/php-enums-phpjp-2021

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PHP 8.1 Enums

PHP 8.1 Enumerations

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PHP 8.1: Enums

- Why we need Enums
- How Enums can help
- Enums in PHP 8.1
- Enum Semantics
- Usage Examples
- Trying out Enums today
- Backwards Compatibility

Why we need Enums

```php
$handle = curl_init();
$options = [
    CURLOPT_URL => 'https://example.com',
    CURLOPT_HTTP_VERSION => CURL_HTTP_VERSION_2_0,
    CURLOPT_RETURNTRANSFER => true,
];
curl_setopt_array($handle, $options);
curl_exec($handle);
```

```php
$handle = curl_init();
$options = [
   CURLOPT_URL => 'https://example.com',
   CURLOPT_HTTP_VERSION => CURL_HTTP_VERSION_2_0,
   CURLOPT_RETURNTRANSFER => true,
];
curl_setopt_array($handle, $options);
curl_exec($handle);
```

```php
$handle = curl_init();
$options = [
    CURLOPT_URL => 'https://example.com',
    CURLOPT_HTTP_VERSION => CURL_HTTP_VERSION_2_0,
    CURLOPT_RETURNTRANSFER => true,
];
var_dump($options);
curl_setopt_array($handle, $options);
curl_exec($handle);
```

```php
$handle = curl_init();
$options = [
   CURLOPT_URL => 'https://example.com',
   CURLOPT_HTTP_VERSION => CURL_HTTP_VERSION_2_0,
   CURLOPT_RETURNTRANSFER => true,
];
var_dump($options);
curl_setopt_array($handle, $options);
curl_exec($handle);
```

```
array(3) {
   [10002]=> string(19) "https://example.com"
   [84]=> int(3)
   [19913]=> bool(true)
}
```

```
define ('CURLOPT_URL', 10002);
define ('CURLOPT_HTTP_VERSION', 84);
define ('CURL_HTTP_VERSION_1_1', 2);
define ('CURL_HTTP_VERSION_2_0', 3);
define ('CURLOPT_RETURNTRANSFER', 19913);
```

```
$handle = curl_init();
$options = [
   CURLOPT_URL => 'https://example.com',
   CURLOPT_HTTP_VERSION => CURL_HTTP_VERSION_2_0,
   CURLOPT_RETURNTRANSFER => true,
];
var_dump($options);
curl_setopt_array($handle, $options);
curl_exec($handle);
```

```
array(3) {
   [10002]=> string(19) "https://example.com"
   [84]=> int(3)
   [19913]=> bool(true)
}
```

```php
define ('CURLOPT_URL', 10002);
define ('CURLOPT_HTTP_VERSION', 84);
define ('CURL_HTTP_VERSION_1_1', 2);
define ('CURL_HTTP_VERSION_2_0', 3);
define ('CURLOPT_RETURNTRANSFER', 19913);
```

```php
$handle = curl_init();
$options = [
   CURLOPT_URL => 'https://example.com',
   CURLOPT_HTTP_VERSION => CURL_HTTP_VERSION_2_0,
   CURLOPT_RETURNTRANSFER => true,
];
var_dump($options);
curl_setopt_array($handle, $options);
curl_exec($handle);
```

```
array(3) {
   [10002]=> string(19) "https://example.com"
   [84]=> int(3)
   [19913]=> bool(true)
}
```

```php
define ('CURLOPT_URL', 10002);
define ('CURLOPT_HTTP_VERSION', 84);
define ('CURL_HTTP_VERSION_1_1', 2);
define ('CURL_HTTP_VERSION_2_0', 3);
define ('CURLOPT_RETURNTRANSFER', 19913);
```

```php
$handle = curl_init();
$options = [
    CURLOPT_URL => 'https://example.com',
    CURLOPT_HTTP_VERSION => CURL_HTTP_VERSION_2_0,
    CURLOPT_RETURNTRANSFER => true,
];
var_dump($options);
curl_setopt_array($handle, $options);
curl_exec($handle);
```

```
array(3) {
  [10002]=> string(19) "https://example.com"
  [84]=> int(3)
  [19913]=> bool(true)
}
```

```php
function curl_setopt(CurlHandle $handle, int $option, mixed $value) : bool {}
function curl_setopt(CurlHandle $handle, int $option, mixed $value) : bool {}
```

```php
function curl_setopt(CurlHandle $handle, int $option, mixed $value) : bool {}
```

```php
curl_setopt($handle, 10002, 'https://example.com');
  10002 - CURLOPT_URL
```

```php
curl_setopt($handle, 10003, 'https://example.com');
```

PHP Error: curl_setopt(): Argument #2 ($option) is not a valid cURL option in ... on line ...

```php
curl_setopt($handle, 10004, 'https://example.com');
  10004 - CURLOPT_PROXY
```

```php
class Post {
    public const POST_STATUS_DRAFT = 'draft';
    public const POST_STATUS_PENDING = 'pending';
    public const POST_STATUS_RETURNED = 'returned';
    public const POST_STATUS_PUBLISHED = 'published';

    public string $status;

    public function updateStatus(string $status): void {}
}
```

```php
class Post {
    public const POST_STATUS_DRAFT = 'draft';
    public const POST_STATUS_PENDING = 'pending';
    public const POST_STATUS_RETURNED = 'returned';
    public const POST_STATUS_PUBLISHED = 'published';

    public string $status;

    public function updateStatus(string $status): void {}
}



$post = new Post();
$post->updateStatus(\Post::POST_STATUS_PUBLISHED);
```

```
class Post {
    public const POST_STATUS_DRAFT = 'draft';
    public const POST_STATUS_PENDING = 'pending';
    public const POST_STATUS_RETURNED = 'returned';
    public const POST_STATUS_PUBLISHED = 'published';

    public string $status;

    public function updateStatus(string $status): void {}
}



$post = new Post();
$post->updateStatus('returned');
```

```php
class Post {
    public const POST_STATUS_DRAFT = 'draft';
    public const POST_STATUS_PENDING = 'pending';
    public const POST_STATUS_RETURNED = 'returned';
    public const POST_STATUS_PUBLISHED = 'published';

    public string $status;

    public function updateStatus(string $status): void {}
}



$post = new Post();
$post->updateStatus('returned');
```

```php
class Post {
    public const POST_STATUS_DRAFT = 'draft';
    public const POST_STATUS_PENDING = 'pending';
    public const POST_STATUS_RETURNED = 'returned';
    public const POST_STATUS_PUBLISHED = 'published';

    public string $status;

    public function updateStatus(string $status): void {}
}
```

```php
class Post {
    public const POST_STATUS_DRAFT = 'draft';
    public const POST_STATUS_PENDING = 'pending';
    public const POST_STATUS_RETURNED = 'returned';
    public const POST_STATUS_PUBLISHED = 'published';

    public string $status;

    public function updateStatus(string $status): void {
        if (  $status !== static::POST_STATUS_DRAFT
            && $status !== static::POST_STATUS_PENDING
            && $status !== static::POST_STATUS_RETURNED
            && $status !== static::POST_STATUS_PUBLISHED
        ) {
            throw new InvalidArgumentException('Invalid state');
        }
    }
}
```

```php
class Post {
   public const POST_STATUS_DRAFT = 'draft';
   public const POST_STATUS_PENDING = 'pending';
   public const POST_STATUS_RETURNED = 'returned';
   public const POST_STATUS_PUBLISHED = 'published';

   public string $status;

   public function updateStatus(string $status): void {
      if (  $status !== static::POST_STATUS_DRAFT
         && $status !== static::POST_STATUS_PENDING
         && $status !== static::POST_STATUS_RETURNED
         && $status !== static::POST_STATUS_PUBLISHED
      ) {
         throw new InvalidArgumentException('Invalid state');
      }
   }
}
```

https://en.wikipedia.org/wiki/Open-closed_principle

How Enums Can Help

```typescript
type PostStatus = "draft" | "pending" | "returned" | "published";
type PostStatus = "draft" | "pending" | "returned" | "published";

function updateStatus(status: PostStatus) {}
```

```typescript
type PostStatus = "draft" | "pending" | "returned" | "published";

function updateStatus(status: PostStatus) {}
```

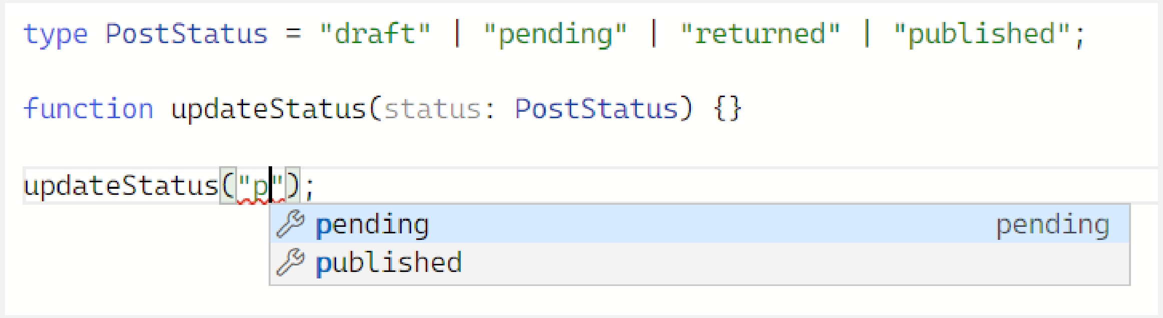
```
type PostStatus = "draft" | "pending" | "returned" | "published";

function updateStatus(status: PostStatus) {}
```

```
updateStatus("draft");
```

✓

```
updateStatus("potato");
```

Argument of type '"potato"' is not assignable to parameter of type 'PostStatus'.



```
type PostStatus = "draft" | "pending" | "returned" | "published";

function updateStatus(status: PostStatus) {}

updateStatus("p");
```

```
enum PostStatus {
    DRAFT,
    PENDING,
    PUBLISHED,
    RETURNED,
};

function updateStatus(status: PostStatus) {
}

updateStatus(PostStatus.DRAFT);
```

TS

```
enum PostStatus {
    DRAFT = "draft",
    PENDING = "pending",
    PUBLISHED  = "published",
    RETURNED  = "draft",
};

function updateStatus(status: PostStatus) {
}

updateStatus(PostStatus.DRAFT);
```

```
enum PostStatus {
    DRAFT = "draft",
    PENDING = "pending",
    PUBLISHED  = "published",
    RETURNED  = "draft",
};
```

```
enum PostStatus {
    DRAFT = "draft";
    PENDING = "pending";
    PUBLISHED  = "published";
    RETURNED  = "draft";
};
```

```
enum PostStatus {

}
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```
class Post {
   public const POST_STATUS_DRAFT = 'draft';
   public const POST_STATUS_PENDING = 'pending';
   public const POST_STATUS_RETURNED = 'returned';
   public const POST_STATUS_PUBLISHED = 'published';

   public string $status;

   public function updateStatus(string $status): void {
      if (  $status !== static::POST_STATUS_DRAFT
         && $status !== static::POST_STATUS_PENDING
         && $status !== static::POST_STATUS_RETURNED
         && $status !== static::POST_STATUS_PUBLISHED
      ) {
         throw new InvalidArgumentException('Invalid state');
      }
   }
}

$post = new Post();
$post->updateStatus(\Post::POST_STATUS_PUBLISHED);
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
class Post {
    public const POST_STATUS_DRAFT = 'draft';
    public const POST_STATUS_PENDING = 'pending';
    public const POST_STATUS_RETURNED = 'returned';
    public const POST_STATUS_PUBLISHED = 'published';

    public string $status;

    public function updateStatus(string $status): void {
        if (  $status !== static::POST_STATUS_DRAFT
           && $status !== static::POST_STATUS_PENDING
           && $status !== static::POST_STATUS_RETURNED
           && $status !== static::POST_STATUS_PUBLISHED
        ) {
           throw new InvalidArgumentException('Invalid state');
        }
    }
}

$post = new Post();
$post->updateStatus(\Post::POST_STATUS_PUBLISHED);
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
class Post {
    ~~public const POST_STATUS_DRAFT = 'draft';~~
    ~~public const POST_STATUS_PENDING = 'pending';~~
    ~~public const POST_STATUS_RETURNED = 'returned';~~
    ~~public const POST_STATUS_PUBLISHED = 'published';~~

    public string $status;

    public function updateStatus(string $status): void {
        if (  $status !== static::POST_STATUS_DRAFT
           && $status !== static::POST_STATUS_PENDING
           && $status !== static::POST_STATUS_RETURNED
           && $status !== static::POST_STATUS_PUBLISHED
        ) {
           throw new InvalidArgumentException('Invalid state');
        }
    }
}

$post = new Post();
$post->updateStatus(\Post::POST_STATUS_PUBLISHED);
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
class Post {
    ~~public const POST_STATUS_DRAFT = 'draft';~~
    ~~public const POST_STATUS_PENDING = 'pending';~~
    ~~public const POST_STATUS_RETURNED = 'returned';~~
    ~~public const POST_STATUS_PUBLISHED = 'published';~~

    public PostStatus $status;

    public function updateStatus(string $status): void {
        if (  $status !== static::POST_STATUS_DRAFT
           && $status !== static::POST_STATUS_PENDING
           && $status !== static::POST_STATUS_RETURNED
           && $status !== static::POST_STATUS_PUBLISHED
        ) {
           throw new InvalidArgumentException('Invalid state');
        }
    }
}

$post = new Post();
$post->updateStatus(\Post::POST_STATUS_PUBLISHED);
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
class Post {
    ~~public const POST_STATUS_DRAFT = 'draft';~~
    ~~public const POST_STATUS_PENDING = 'pending';~~
    ~~public const POST_STATUS_RETURNED = 'returned';~~
    ~~public const POST_STATUS_PUBLISHED = 'published';~~

    public PostStatus $status;

    public function updateStatus(PostStatus $status): void {
        if (  $status !== static::POST_STATUS_DRAFT
           && $status !== static::POST_STATUS_PENDING
           && $status !== static::POST_STATUS_RETURNED
           && $status !== static::POST_STATUS_PUBLISHED
        ) {
           throw new InvalidArgumentException('Invalid state');
        }
    }
}

$post = new Post();
$post->updateStatus(\Post::POST_STATUS_PUBLISHED);
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
class Post {
    ~~public const POST_STATUS_DRAFT = 'draft';~~
    ~~public const POST_STATUS_PENDING = 'pending';~~
    ~~public const POST_STATUS_RETURNED = 'returned';~~
    ~~public const POST_STATUS_PUBLISHED = 'published';~~

    public PostStatus $status;

    public function updateStatus(PostStatus $status): void {
        if (  $status !== static::POST_STATUS_DRAFT
           && $status !== static::POST_STATUS_PENDING
           && $status !== static::POST_STATUS_RETURNED
           && $status !== static::POST_STATUS_PUBLISHED
        ) {
           throw new InvalidArgumentException('Invalid state');
        }
    }
}

$post = new Post();
$post->updateStatus(\Post::POST_STATUS_PUBLISHED);
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
class Post {
    ~~public const POST_STATUS_DRAFT = 'draft';~~
    ~~public const POST_STATUS_PENDING = 'pending';~~
    ~~public const POST_STATUS_RETURNED = 'returned';~~
    ~~public const POST_STATUS_PUBLISHED = 'published';~~

    public PostStatus $status;

    public function updateStatus(PostStatus $status): void {
        ~~if (   $status !== static::POST_STATUS_DRAFT~~
            ~~&& $status !== static::POST_STATUS_PENDING~~
            ~~&& $status !== static::POST_STATUS_RETURNED~~
            ~~&& $status !== static::POST_STATUS_PUBLISHED~~
        ~~) {~~
            ~~throw new InvalidArgumentException('Invalid state');~~
        ~~}~~
    }
}

$post = new Post();
$post->updateStatus(\Post::POST_STATUS_PUBLISHED);
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
class Post {
    ~~public const POST_STATUS_DRAFT = 'draft';~~
    ~~public const POST_STATUS_PENDING = 'pending';~~
    ~~public const POST_STATUS_RETURNED = 'returned';~~
    ~~public const POST_STATUS_PUBLISHED = 'published';~~

    public PostStatus $status;

    public function updateStatus(PostStatus $status): void {
        ~~if (   $status !== static::POST_STATUS_DRAFT~~
            ~~&& $status !== static::POST_STATUS_PENDING~~
            ~~&& $status !== static::POST_STATUS_RETURNED~~
            ~~&& $status !== static::POST_STATUS_PUBLISHED~~
        ~~) {~~
            ~~throw new InvalidArgumentException('Invalid state');~~
        ~~}~~
    }
}

$post = new Post();
$post->updateStatus(PostStatus::PUBLISHED);
```

How Enums Can Help

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
class Post {
   public PostStatus $status;

   public function updateStatus(PostStatus $status): void {

   }
}

$post = new Post();
$post->updateStatus(\PostStatus::PUBLISHED);
```

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
function setIsSponsored(bool $sponsored): void {

}

function isSponsored(): bool {

}

setIsSponsored(true);
setIsSponsored(false);
```

Enums in PHP 8.1

- **Enums can have zero or more members**

```
enum Suit {
}
```

- **Enums can have zero or more members**

```php
enum Suit {
   case Clubs;
   case Diamonds;
   case Spades;
   case Hearts;
}
```

- Enums can have zero or more members
- **Enum members are `objects`**

```php
enum Suit {
   case Clubs;
   case Diamonds;
   case Spades;
   case Hearts;
}
```

```php
is_object(Suit::Hearts);
// true
```

- Enums can have zero or more members
- **Enum members are `objects`**

```
enum Suit {
   case Clubs;
   case Diamonds;
   case Spades;
   case Hearts;
}
```

```
var_dump(Suit::Hearts);
// enum(Suit::Hearts)
```

- Enums can have zero or more members
- Enum members are `objects`
- **Enums can be namespaced and autoloaded**

```php
namespace App\PlayingCards;

enum Suit {
   case Clubs;
   case Diamonds;
   case Spades;
   case Hearts;
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- **May contain `string|int` backed values**

```php
namespace App\PlayingCards;

enum Suit: int {
    case Clubs = 1;
    case Diamonds = 2;
    case Spades = 3;
    case Hearts = 4;
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- **May contain `string|int` backed values**

```
namespace App\PlayingCards;

enum Suit: string {
    case Clubs = '♣';
    case Diamonds = '♦';
    case Spades = '♠';
    case Hearts = '♥';
}
```

```php
namespace App\PlayingCards;

enum Suit: string {

    const AWESOME = 'Yes';

    case Clubs = '♣';
    case Diamonds = '♦';
    case Spades = '♠';
    case Hearts = '♥';
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- May contain `string|int` backed values
- **May contain non-duplicated constants**

```php
namespace App\PlayingCards;

enum Suit: string {

    const AWESOME = 'Yes';

    case Clubs = '♣';
    case Diamonds = '♦';
    case Spades = '♠';
    case Hearts = '♥';

    public static function cheer(): void {
        echo 'Yay!';
    }
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- May contain `string|int` backed values
- May contain non-duplicated constants
- **May contain `static` methods**

```php
Suit::cheer();
// Yay!
```

```php
namespace App\PlayingCards;

enum Suit: string {
    const AWESOME = 'Yes';

    case Clubs = '♣';
    case Diamonds = '♦';
    case Spades = '♠';
    case Hearts = '♥';

    public static function cheer(): void {
        echo 'Yay!';
    }

    public function show(): void {
        var_dump($this);
        var_dump($this->name);
        var_dump(self::Clubs->name);
        var_dump($this->value);
        var_dump(self::Clubs->value);
    }
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- May contain `string|int` backed values
- May contain non-duplicated constants
- May contain `static` methods
- **May contain non-`static` methods**

```php
Suit::Clubs->show();
```

```php
namespace App\PlayingCards;

enum Suit: string {
    const AWESOME = 'Yes';

    case Clubs = '♣';
    case Diamonds = '♦';
    case Spades = '♠';
    case Hearts = '♥';

    public static function cheer(): void {
        echo 'Yay!';
    }

    public function show(): void {
        var_dump($this);
        var_dump($this->name);
        var_dump(self::Clubs->name);
        var_dump($this->value);
        var_dump(self::Clubs->value);
    }
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- May contain `string|int` backed values
- May contain non-duplicated constants
- May contain `static` methods
- May contain non-`static` methods
- `$this` refers to the Enumerated element

```php
Suit::Clubs->show();
```

```
enum(App\PlayingCards\Suit::Clubs)
```

```php
namespace App\PlayingCards;

enum Suit: string {
    const AWESOME = 'Yes';

    case Clubs = '♣';
    case Diamonds = '♦';
    case Spades = '♠';
    case Hearts = '♥';

    public static function cheer(): void {
        echo 'Yay!';
    }

    public function show(): void {
        var_dump($this);
        var_dump($this->name);
        var_dump(self::Clubs->name);
        var_dump($this->value);
        var_dump(self::Clubs->value);
    }
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- May contain `string|int` backed values
- May contain non-duplicated constants
- May contain `static` methods
- May contain non-`static` methods
- `$this` refers to the Enumerated element
- **`->name` property is the name of the member**

```php
Suit::Clubs->show();
```

```
enum(App\PlayingCards\Suit::Clubs)
string(5) "Clubs"
string(5) "Clubs"
```

```php
namespace App\PlayingCards;

enum Suit: string {
    const AWESOME = 'Yes';

    case Clubs = '♣';
    case Diamonds = '♦';
    case Spades = '♠';
    case Hearts = '♥';

    public static function cheer(): void {
        echo 'Yay!';
    }

    public function show(): void {
        var_dump($this);
        var_dump($this->name);
        var_dump(self::Clubs->name);
        var_dump($this->value);
        var_dump(self::Clubs->value);
    }
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- May contain `string|int` backed values
- May contain non-duplicated constants
- May contain `static` methods
- May contain non-`static` methods
- `$this` refers to the Enumerated element
- `->name` property is the name of the member
- **`->value` property is the backed value**

```php
Suit::Clubs->show();
```

```
enum(App\PlayingCards\Suit::Clubs)
string(5) "Clubs"
string(5) "Clubs"
string(6) "♣"
string(6) "♣"
```

```php
namespace App\PlayingCards;

enum Suit: string {
    const AWESOME = 'Yes';

    case Clubs = '♣';
    case Diamonds = '♦';
    case Spades = '♠';
    case Hearts = '♥';

    public static function cheer(): void {
        echo 'Yay!';
    }

    public function show(): void {
        var_dump($this);
        var_dump($this->name);
        var_dump(self::Clubs->name);
        var_dump($this->value);
        var_dump(self::Clubs->value);
    }
}
```

- Enums can have zero or more members
- Enum members are `objects`
- Enums can be namespaced and autoloaded
- May contain `string|int` backed values
- May contain non-duplicated constants
- May contain `static` methods
- May contain non-`static` methods
- `$this` refers to the Enumerated element
- `->name` property is the name of the member
- `->value` property is the backed value

```php
Suit::Clubs->show();
```

```
enum(App\PlayingCards\Suit::Clubs)
string(5) "Clubs"
string(5) "Clubs"
string(6) "♣"
string(6) "♣"
```

Unit Enums

```php
enum PostStatus {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

Unit Enums

```
enum PostStatus implements UnitEnum {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

Unit Enums

```
interface UnitEnum {
    public static function cases(): array;
}
```

```
enum PostStatus implements UnitEnum {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

Unit Enums

```php
interface UnitEnum {
    public static function cases(): array;
}
```

```php
enum PostStatus implements UnitEnum {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"
```

Unit Enums

```php
interface UnitEnum {
    public static function cases(): array;
}
```

```php
enum PostStatus implements UnitEnum {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"
```

Unit Enums

```php
interface UnitEnum {
    public static function cases(): array;
}
```

```php
enum PostStatus implements UnitEnum {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"
```

```php
PostStatus::cases();
```

Unit Enums

```php
interface UnitEnum {
    public static function cases(): array;
}
```

```php
enum PostStatus implements UnitEnum {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"
```

```php
PostStatus::cases();
```

```
array(4) {
  [0]=> enum(PostStatus::DRAFT)
  [1]=> enum(PostStatus::PENDING)
  [2]=> enum(PostStatus::RETURNED)
  [3]=> enum(PostStatus::PUBLISHED)
}
```

Unit Enums

```php
interface UnitEnum {
    public static function cases(): array;
}
```

```php
enum PostStatus implements UnitEnum {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"
```

```php
PostStatus::cases();
```

```
array(4) {
  [0]=> enum(PostStatus::DRAFT)
  [1]=> enum(PostStatus::PENDING)
  [2]=> enum(PostStatus::RETURNED)
  [3]=> enum(PostStatus::PUBLISHED)
}
```

Backed Enums

Backed Enums extend Unit Enums

```php
enum PostStatus: string {
    case DRAFT = 'draft';
    case PENDING = 'pending’;
    case RETURNED = 'returned';
    case PUBLISHED = 'published';
}
```

Backed Enums

Backed Enums extend Unit Enums

```
enum PostStatus: string implements BackedEnum {
    case DRAFT = 'draft';
    case PENDING = 'pending';
    case RETURNED = 'returned';
    case PUBLISHED = 'published';
}
```

Backed Enums

Backed Enums extend Unit Enums

```
interface BackedEnum extends UnitEnum {
   public static function from(int|string $value): static;
   public static function tryFrom(int|string $value): ?static;
}



enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

Backed Enums

Backed Enums extend Unit Enums

```
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```
echo PostStatus::DRAFT->name;
// "DRAFT"
```

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"
```

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"
```

```php
echo PostStatus::DRAFT->value;
// "draft"
```

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"

echo PostStatus::DRAFT->value;
// "draft"
```

```php
PostStatus::tryFrom('draft');
PostStatus::from('draft');
```

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"

echo PostStatus::DRAFT->value;
// "draft"
```

```php
PostStatus::tryFrom('draft');
PostStatus::from('draft');
```

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"

echo PostStatus::DRAFT->value;
// "draft"
```

```php
PostStatus::tryFrom('draft');
PostStatus::from('draft');
```

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"

echo PostStatus::DRAFT->value;
// "draft"
```

```php
PostStatus::tryFrom('draft');
PostStatus::from('draft');
```

```
enum(PostStatus::DRAFT)
```

Backed Enums

Backed Enums extend Unit Enums

```
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```
echo PostStatus::DRAFT->name;
// "DRAFT"

echo PostStatus::DRAFT->value;
// "draft"

PostStatus::tryFrom('draft');
PostStatus::from('draft');
  enum(PostStatus::DRAFT)
```

```
PostStatus::tryFrom('potato');
PostStatus::from('potato');
```

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"

echo PostStatus::DRAFT->value;
// "draft"

PostStatus::tryFrom('draft');
PostStatus::from('draft');
  enum(PostStatus::DRAFT)


PostStatus::tryFrom('potato');
PostStatus::from('potato');
```

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"

echo PostStatus::DRAFT->value;
// "draft"

PostStatus::tryFrom('draft');
PostStatus::from('draft');
  enum(PostStatus::DRAFT)



PostStatus::tryFrom('potato');
// null

PostStatus::from('potato');
```

Uncaught ValueError: "potato" is not a valid backing value for enum "PostStatus"

Backed Enums

Backed Enums extend Unit Enums

```php
interface BackedEnum extends UnitEnum {
   public static function from(
         int|string $value
   ): static;

   public static function tryFrom(
         int|string $value
   ): ?static;
}


enum PostStatus: string implements BackedEnum {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}
```

```php
echo PostStatus::DRAFT->name;
// "DRAFT"

echo PostStatus::DRAFT->value;
// "draft"

PostStatus::tryFrom('draft');
PostStatus::from('draft');
  enum(PostStatus::DRAFT)



PostStatus::tryFrom('potato');
// null

PostStatus::from('potato');
```

Uncaught ValueError: "potato" is not a valid backing value for enum "PostStatus"

Enum Semantics

Enum

Enumerated type that contains a fixed number of members.

Enum

Enumerated **type** that contains a fixed number of members.

A type that is supported as parameter, return, and property type in PHP, and the type is enforced by PHP itself.

Enum

Enumerated type that **<u>contains</u>** a fixed number of members.

All members are contained within a declared Enum.

Enum

Enumerated type that contains a **fixed** number of members.

Members of an Enum is fixed at the declaration time.
An enumerated member is identical to the same member everywhere.
Enums must not contain state.

Enumerated types

```
enum Suit {
    case Spades;
    case Hearts;
    case Clubs;
    case Diamonds;
}
```

```
function play_card(Suit $suit, string $card) {}

function pick_a_suit(): Suit {
    return Suit::Spades;
}
```

```
play_card(Suit::Spades, 'A');
var_dump(pick_a_suit());
// enum(Suit::Spades)
```

Enumerated types

```php
enum Suit {
    case Spades;
    case Hearts;
    case Clubs;
    case Diamonds;
}
```

```php
function play_card(Suit $suit, string $card) {}

function pick_a_suit(): Suit {
    return Suit::Spades;
}



play_card(Fruits::Apple);
play_card(Languages::English);
play_card('potato');
```

```
Fatal error: Uncaught TypeError: play_card(): Argument #1
($suit) must be of type Suit, string given
```

Closed Set

```
enum Suit {
    case Spades;
    case Hearts;
    case Clubs;
    case Diamonds;
}
```

Fixed Members

```
enum Suit {
    case Spades;
    case Hearts;
    case Clubs;
    case Diamonds;
}
```

```
Suit::Spades === Suit::Spades
```

Fixed Members

```php
enum Suit {
    case Spades;
    case Hearts;
    case Clubs;
    case Diamonds;
}
```

```php
enum RussianSuit extends Suit {}
```

```
Parse error: syntax error, unexpected token "extends",
expecting "{"
```

No Properties Allowed

```
enum Suit {
    case Spades;
    case Hearts;
    case Clubs;
    case Diamonds;

    private string $foo;
}
```

```
Fatal error: Enums may not include properties
```

Backed Enums *must* assign values for all cases

```
enum HTTPMethods: string {
    case GET;
    case POST;
}
```

```
Fatal error: Case GET of backed enum HTTPMethods must have a value
```

Enum cases and values *must* be unique

```php
enum Test {
    case FOO;
    case FOO;
}
```

Fatal error: Cannot redefine class constant Test::FOO

```php
enum Test: string {
    case FOO = 'baz';
    case BAR = 'baz';
}
```

Fatal error: Duplicate value in enum Test for cases FOO and BAR

Class Semantics

- Supports namespaces
- Supports traits
- Supports autoloading
- Supports magic constants
- Supports `instanceof`
- **`Supports methods`**

```php
namespace Foo\Bar;

enum PostStatus: string implements EntityStatues {

   use TestTrait;

   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published’;

   public static function showOff(): void {
      echo __CLASS__ . static::class;
   }

}
```

Usage Examples

```
enum PostStatus: string {
    case DRAFT = 'draft';
    case PENDING = 'pending’;
    case RETURNED = 'returned';
    case PUBLISHED = 'published';
}
```

```php
enum PostStatus: string {
    case DRAFT = 'draft';
    case PENDING = 'pending’;
    case RETURNED = 'returned';
    case PUBLISHED = 'published';
}
```

```php
class Post {
    private int $id;
    private string $title;
    private PostStatus $status;

    public function __construct(
        int $id,
        string $title,
        PostStatus $status
    ) {
        // ...
    }


    public function getStatus(): PostStatus {
        return $this->status;
    }
}
```

Usage Examples

```php
enum PostStatus: string {
    case DRAFT = 'draft';
    case PENDING = 'pending’;
    case RETURNED = 'returned';
    case PUBLISHED = 'published';
}
```

```php
class Post {
    private int $id;
    private string $title;
    private PostStatus $status;

    public function __construct(
        int $id,
        string $title,
        PostStatus $status
    ) {
        // ...
    }


    public function getStatus(): PostStatus {
        return $this->status;
    }
}
```

Usage Examples

```php
enum PostStatus: string {
    case DRAFT = 'draft';
    case PENDING = 'pending’;
    case RETURNED = 'returned';
    case PUBLISHED = 'published';
}
```

```php
class Post {
    private int $id;
    private string $title;
    private PostStatus $status;

    public function __construct(
        int $id,
        string $title,
        PostStatus $status
    ) {
        // ...
    }


    public function getStatus(): PostStatus {
        return $this->status;
    }
}
```

```php
enum PostStatus: string {
    case DRAFT = 'draft';
    case PENDING = 'pending’;
    case RETURNED = 'returned';
    case PUBLISHED = 'published';
}
```

```php
class Post {
    private int $id;
    private string $title;
    private PostStatus $status;

    public function __construct(
        int $id,
        string $title,
        PostStatus $status
    ) {
        // ...
    }


    public function getStatus(): PostStatus {
        return $this->status;
    }
}
```

Usage Examples

```php
enum PostStatus: string {
   case DRAFT = 'draft';
   case PENDING = 'pending’;
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}



class Post {
   private int $id;
   private string $title;
   private PostStatus $status;

   public function __construct(
      int $id,
      string $title,
      PostStatus $status
   ) {
      // ...
   }


   public function getStatus(): PostStatus {
      return $this->status;
   }
}
```

```php
$stmt = $pdo->prepare("
    SELECT *
    FROM posts
    WHERE post_status=?");
$stmt->execute([
    PostStatus::PUBLISHED->value
]);
$post = $stmt->fetch();
```

Usage Examples

```php
enum PostStatus: string {
   case DRAFT = 'draft';
   case PENDING = 'pending’;
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}



class Post {
   private int $id;
   private string $title;
   private PostStatus $status;

   public function __construct(
      int $id,
      string $title,
      PostStatus $status
   ) {
      // ...
   }


   public function getStatus(): PostStatus {
      return $this->status;
   }
}
```

```php
$stmt = $pdo->prepare("
    SELECT *
    FROM posts
    WHERE post_status=?");
$stmt->execute([
    PostStatus::PUBLISHED->value
]);
$post = $stmt->fetch();
```

Usage Examples

```php
enum PostStatus: string {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}



class Post {
   private int $id;
   private string $title;
   private PostStatus $status;

   public function __construct(
      int $id,
      string $title,
      PostStatus $status
   ) {
      // ...
   }


   public function getStatus(): PostStatus {
      return $this->status;
   }
}
```

```php
$sql = "
   INSERT INTO
       posts (id, title, post_status)
    VALUES
        (:id, :title, :post_status)";
$stmt= $pdo->prepare($sql);
$stmt->execute([
   'id' => $post->getId(),
   'title' => $post->getTitle(),
   'post_status' => $post->getStatus()->value,
]);
```

Usage Examples

```php
enum PostStatus: string {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}



class Post {
   private int $id;
   private string $title;
   private PostStatus $status;

   public function __construct(
      int $id,
      string $title,
      PostStatus $status
   ) {
      // ...
   }


   public function getStatus(): PostStatus {
      return $this->status;
   }
}
```

```php
$sql = "
   INSERT INTO
       posts (id, title, post_status)
    VALUES
        (:id, :title, :post_status)";
$stmt= $pdo->prepare($sql);
$stmt->execute([
   'id' => $post->getId(),
   'title' => $post->getTitle(),
   'post_status' => $post->getStatus()->value,
]);
```

Usage Examples

```php
enum PostStatus: string {
   case DRAFT = 'draft';
   case PENDING = 'pending’;
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}

class Post {
   private int $id;
   private string $title;
   private PostStatus $status;

   public function __construct(
      int $id,
      string $title,
      PostStatus $status
   ) {
      // ...
   }


   public function getStatus(): PostStatus {
      return $this->status;
   }

   public function updateStatus(
       PostStatus $status
   ): void {

   }
}
```

```php
$result = [
   'id' => 42,
   'title' => 'PHP Enums',
   'post_status' => 'published',
];

$post = new Post(
   $result['id'],
   $result['title']
);

$post->updateStatus(
   PostStatus::from($result['post_status'])
);
```

Usage Examples

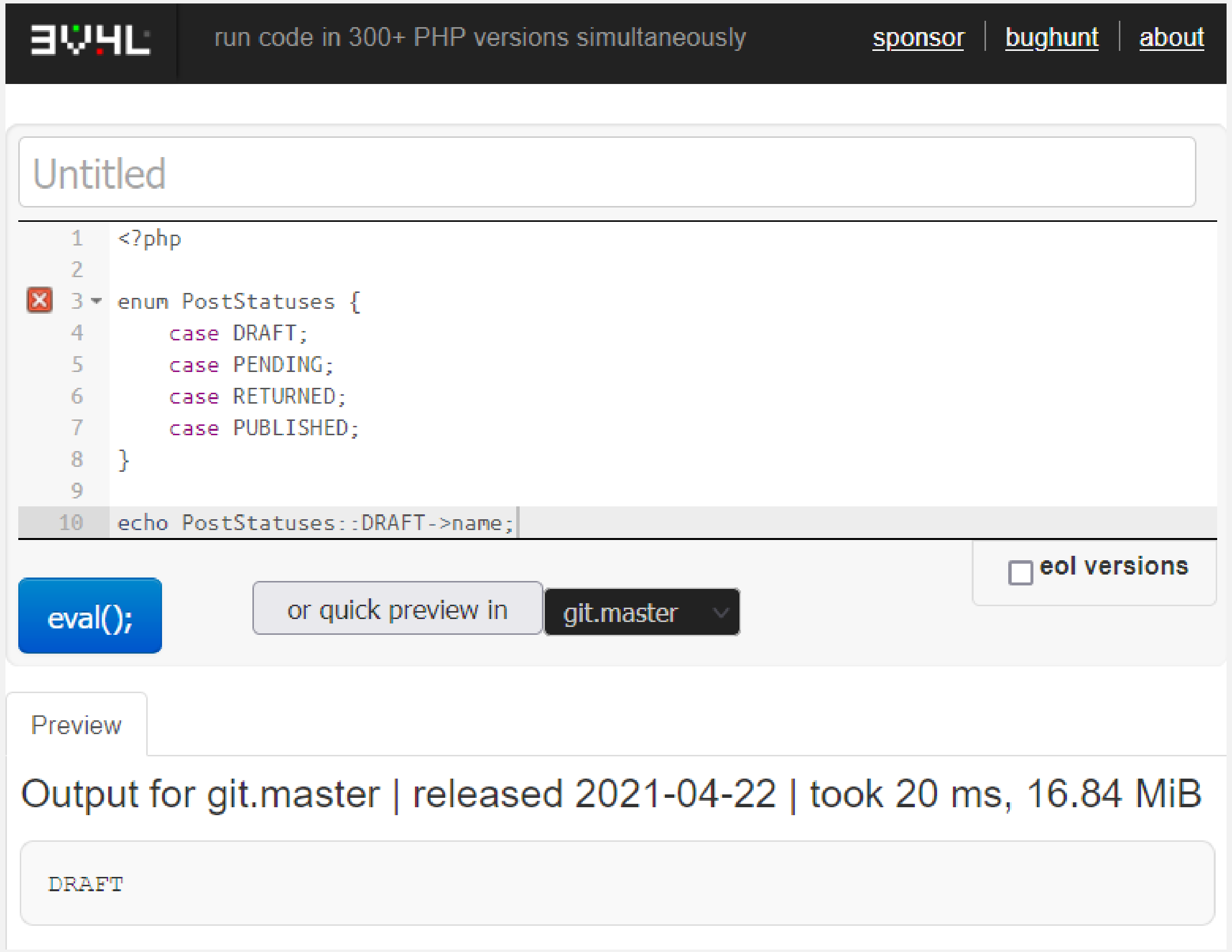
```php
enum PostStatus: string {
   case DRAFT = 'draft';
   case PENDING = 'pending';
   case RETURNED = 'returned';
   case PUBLISHED = 'published';
}

class Post {
   private int $id;
   private string $title;
   private PostStatus $status;

   public function __construct(
      int $id,
      string $title,
      PostStatus $status
   ) {
      // ...
   }


   public function getStatus(): PostStatus {
      return $this->status;
   }

   public function updateStatus(
       PostStatus $status
   ): void {

   }
}
```

```php
$result = [
   'id' => 42,
   'title' => 'PHP Enums',
   'post_status' => 'published',
];

$post = new Post(
   $result['id'],
   $result['title']
);

$post->updateStatus(
   PostStatus::from($result['post_status'])
);
```

Usage Examples

Trying out Enums today

Try it online with 3v4l.org



```php
<?php

enum PostStatuses {
    case DRAFT;
    case PENDING;
    case RETURNED;
    case PUBLISHED;
}

echo PostStatuses::DRAFT->name;
```

Output for git.master | released 2021-04-22 | took 20 ms, 16.84 MiB

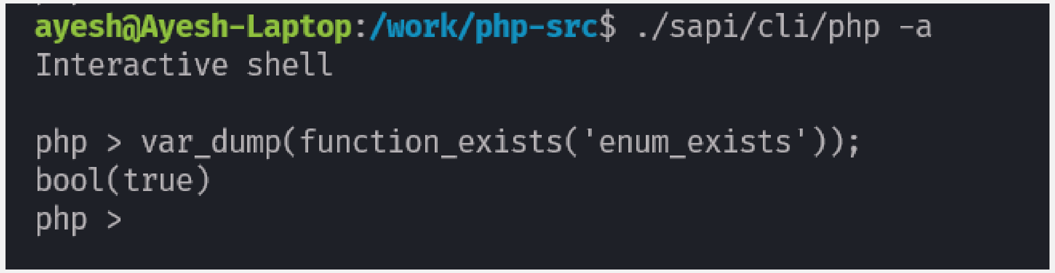
```
DRAFT
```

Nightly Docker Images

```
docker pull phpdaily/php:8.1-dev
```

Self-compile PHP from source

```
$  git clone git@github.com:php/php-src.git
$  ./buildconf
$  ./configure
$  make -j$(nproc)
$  ./sapi/cli/php -a
```



```
ayesh@Ayesh-Laptop:/work/php-src$ ./sapi/cli/php -a
Interactive shell

php > var_dump(function_exists('enum_exists'));
bool(true)
php >
```

https://php.watch/articles/compile-php-ubuntu

Backwards Compatibility

Enums is a new syntax

Enums is a new syntax introduced in PHP 8.1, and not supported in older PHP versions.

```
Parse error: syntax error, unexpected identifier "PostStatus"
```

User-land PHP implementations

https://github.com/myclabs/php-enum

```php
use MyCLabs\Enum\Enum;

class PostStatus extends Enum {
   private const DRAFT = 'draft';
   private const PENDING = 'pending';
   private const RETURNED = 'returned';
   private const PUBLISHED = 'published';
}
```

Further Resources

- https://aye.sh/talk/php-enums-phpjp-2021
- https://php.watch/versions/8.1/enums
- https://php.watch/versions/8.1
- https://wiki.php.net/rfc/enumerations
- https://phpinternals.news/73
- https://github.com/php/php-src/pull/6489/
- https://externals.io/message/112626
- https://github.com/phpdaily/php
- https://3v4l.org/
- https://php.watch/articles/compile-php-ubuntu

Questions?

No question is too small.

@Ayeshlive ayesh@php.watch

https://aye.sh/talk/php-enums-phpjp-2021 dziękuję Ďakujem tak

arigatô paldies

grazie děkuji mahalo kop khun

diolch dankie

köszönöm

cảm ơn bạn хвала shukran

tänan Баярлалаа

a dank gràcies dhanyavād

THANK YOU

ありがとうございました

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tack

ngiyabonga

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Ǹh'gōi

mulţumesc

ස්තුතියි ačiū תודה.

takk nandri

danke

faleminderit

Xièxiè

teşekkür ederim choukrane

obrigado kiitos

Շնորհակալություն

terima kasih hvala grazzi

PHP 8.1 Enums

Ayesh Karunaratne | https://aye.sh/talk/php-enums-phpjp-2021

phpcon

CONFERENCE JAPAN 2021