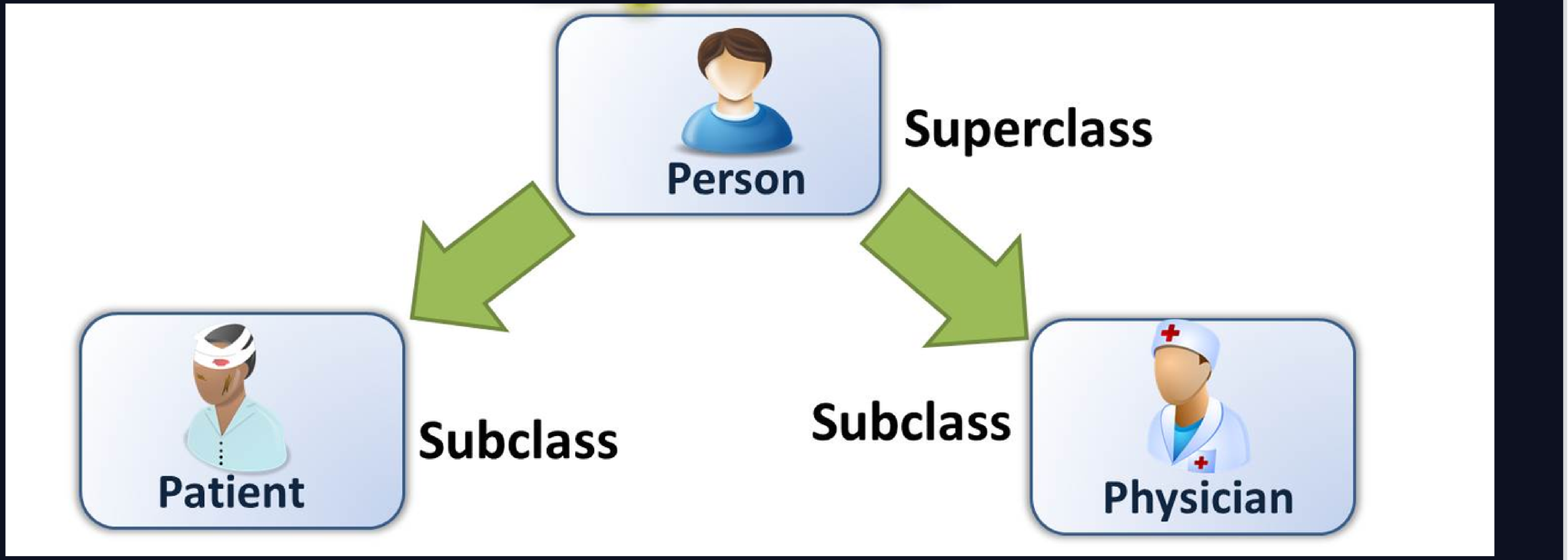
OBJECT ORIENTED PROGRAMMING

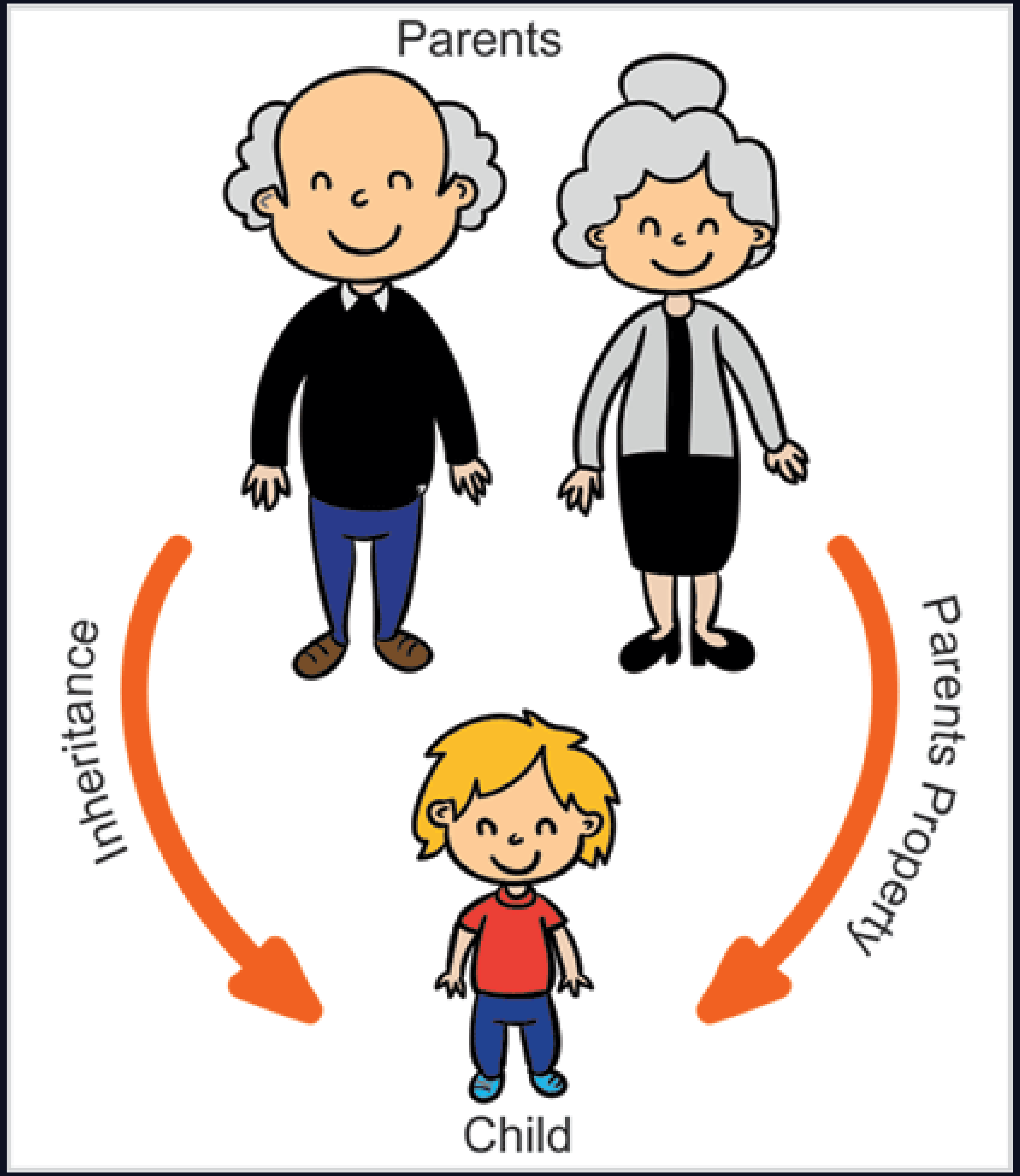
Inheritance & Composition

What is an Inheritance ?

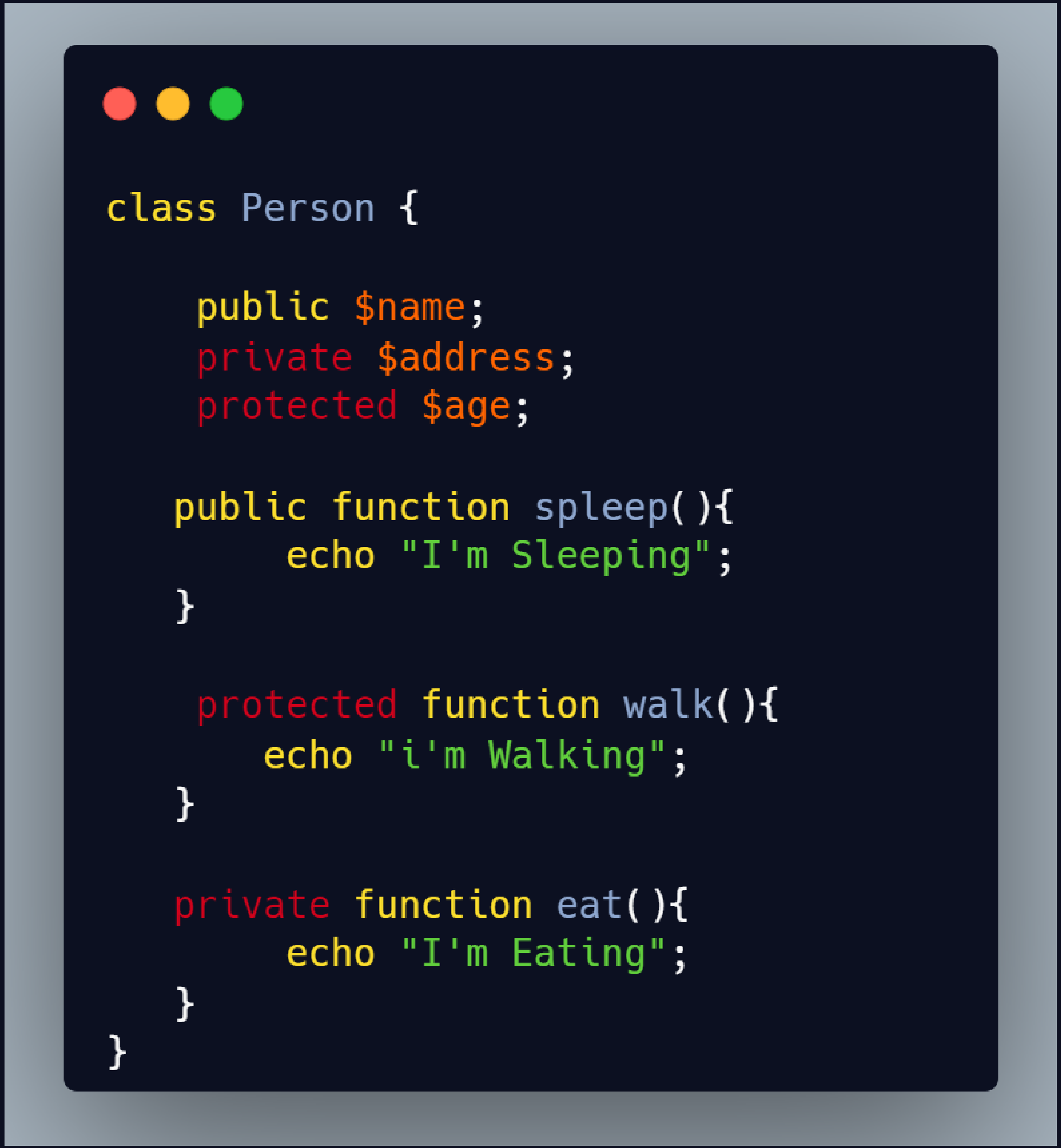
- When a class derives from another class.
- Relation Between Two Classes.
- The child class will inherit all the public and protected properties and methods from the parent class
- **It's a Relation Called ' IS-A ' Relation**
- **Child Class can have its own properties and methods**
- Using the extends keyword to Make Inheritance Relation
- Parent : Who Give His Properties and Method To Child. Called Superclass
- Child : Who Take the Properties and Methods From the Parent. Called Subclass

Example...


Person
Superclass
Patient
Subclass
Subclass
Physician

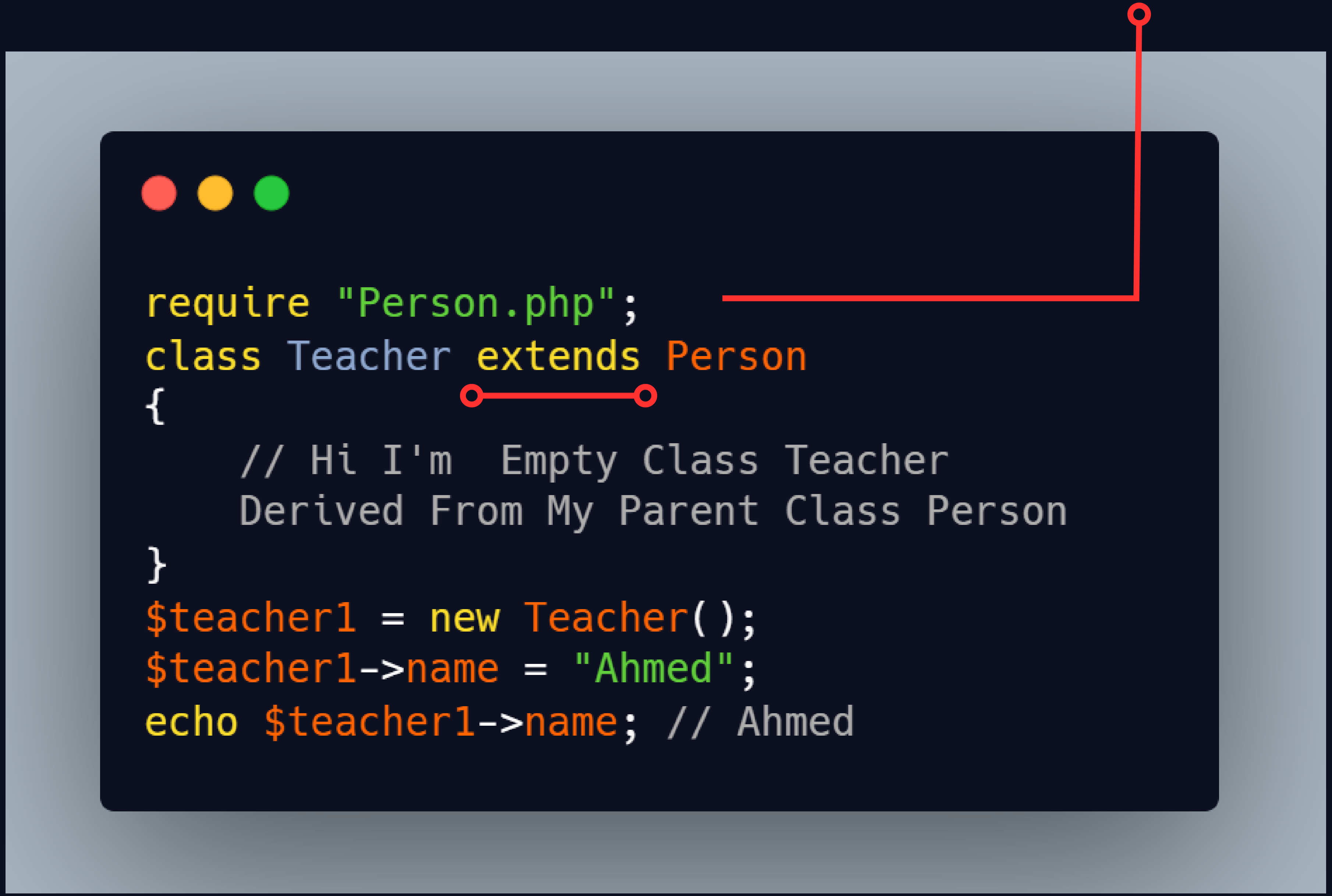

Parents
Inheritance
Parents Property
Child

Coding...



```
class Person {

     public $name;
     private $address;
     protected $age;

    public function spleep(){
         echo "I'm Sleeping";
    }

     protected function walk(){
        echo "i'm Walking";
    }

    private function eat(){
         echo "I'm Eating";
    }
}
```

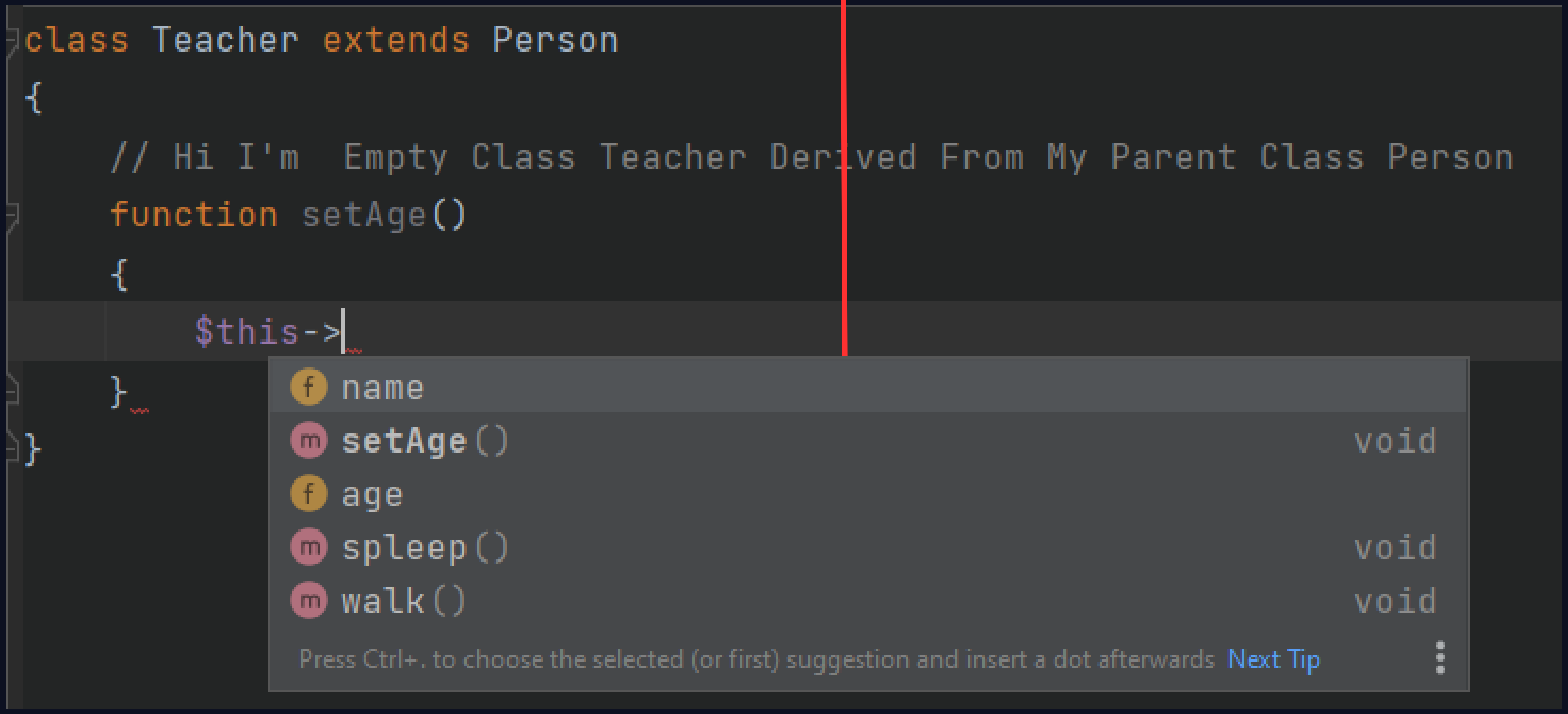
To Can Access The class in another File



```
require "Person.php";
class Teacher extends Person
{
    // Hi I'm  Empty Class Teacher
    Derived From My Parent Class Person
}
$teacher1 = new Teacher();
$teacher1->name = "Ahmed";
echo $teacher1->name; // Ahmed
```

Coding...

Without Declare Any Properties or Method !!! WoW



```
class Teacher extends Person
{
    // Hi I'm  Empty Class Teacher Derived From My Parent Class Person
    function setAge()
    {
        $this->
    }
}
```

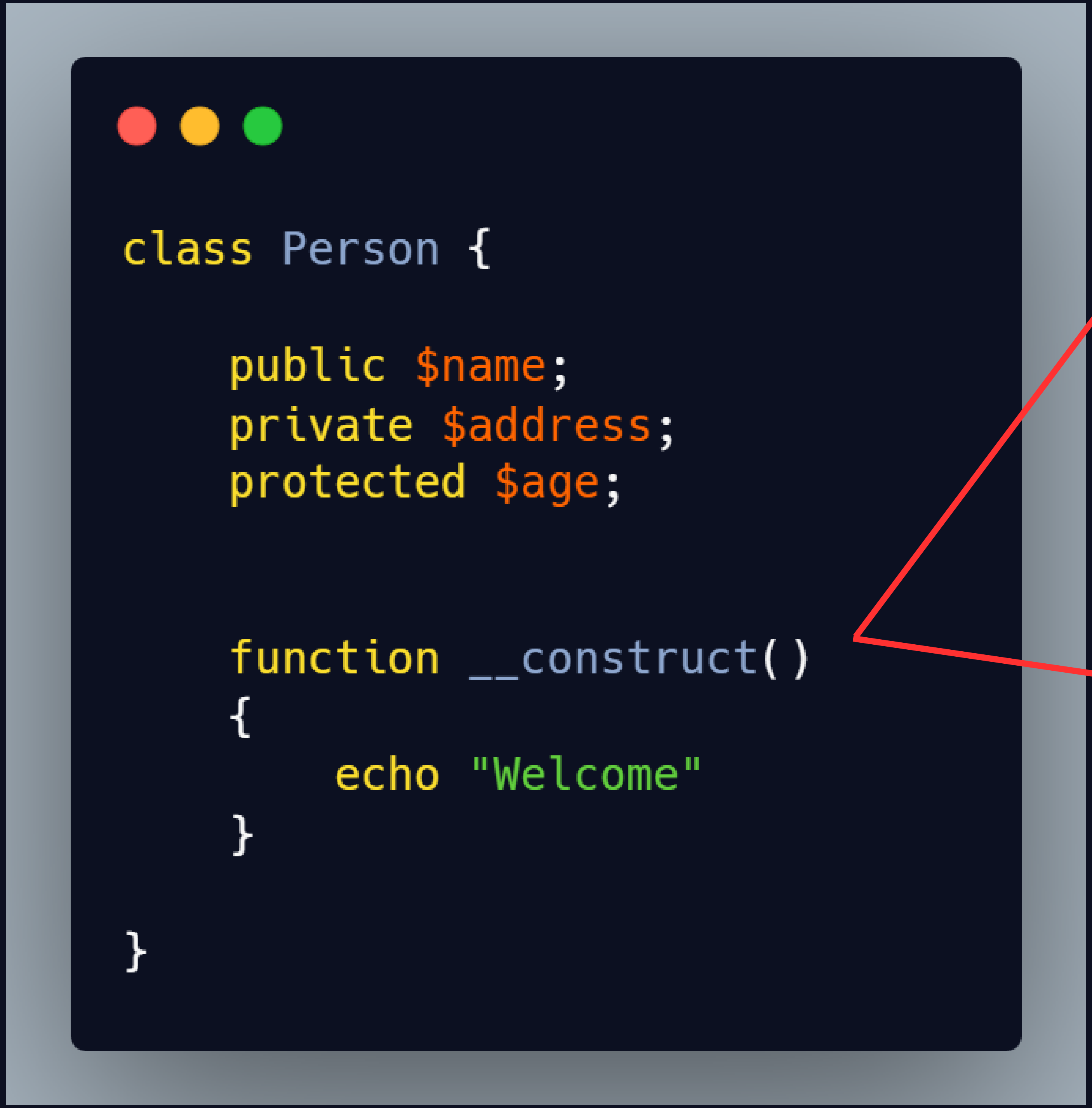
Press Ctrl+. to choose the selected (or first) suggestion and insert a dot afterwards Next Tip

BUT hamm

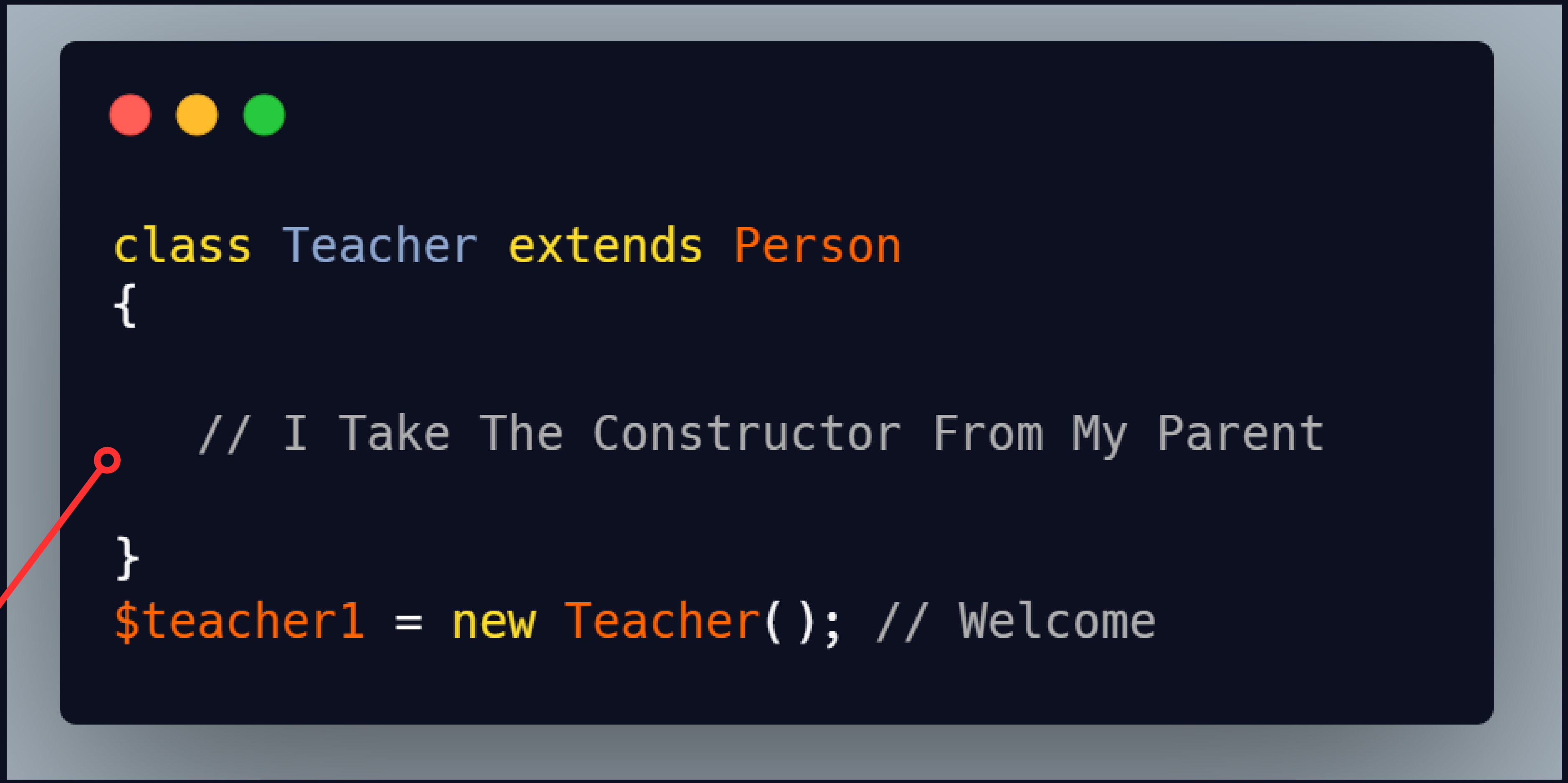
Where Is address and eat()?

PRIVATE

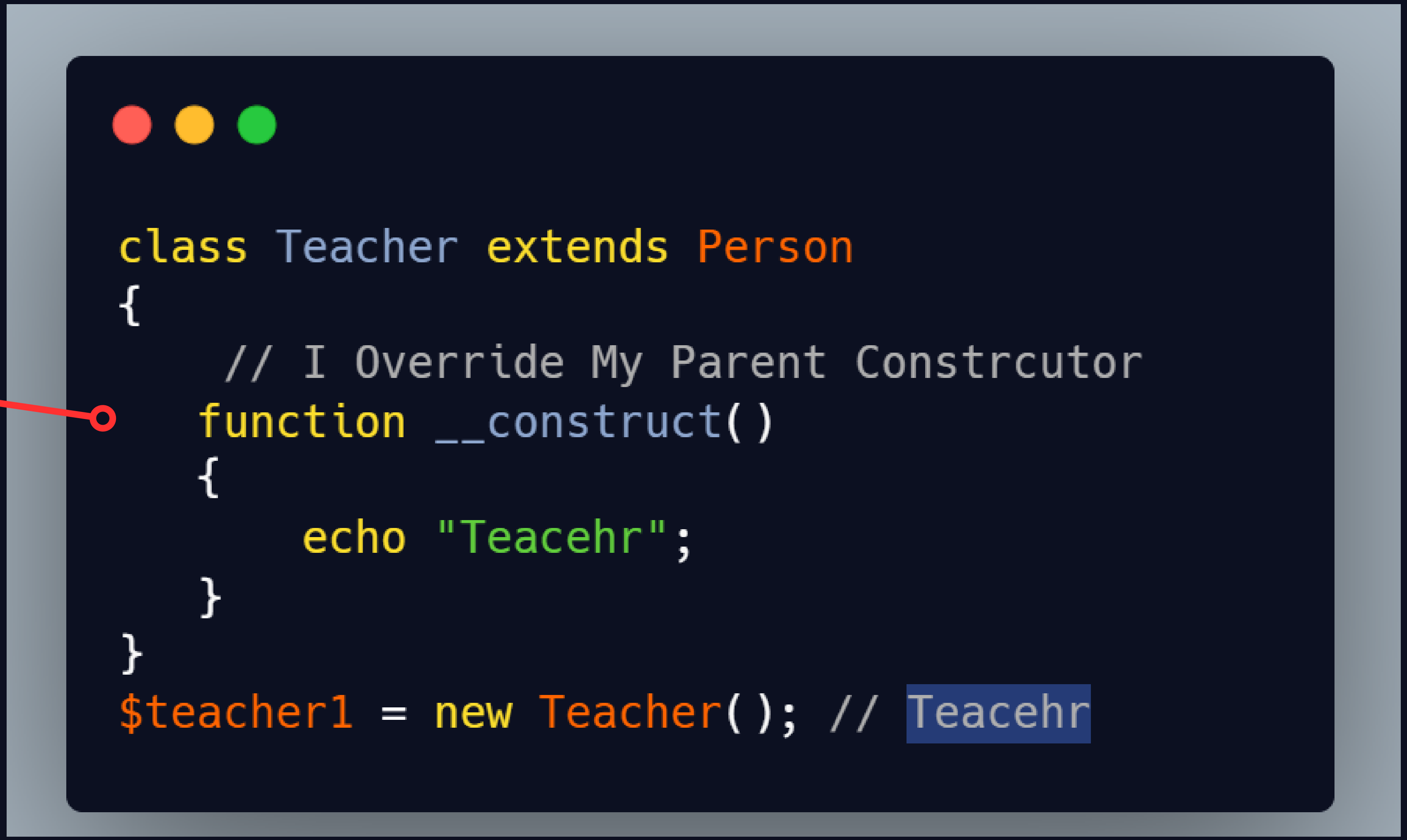
What About Constructor



```
class Person {

    public $name;
    private $address;
    protected $age;


    function __construct()
    {
        echo "Welcome"
    }

}
```



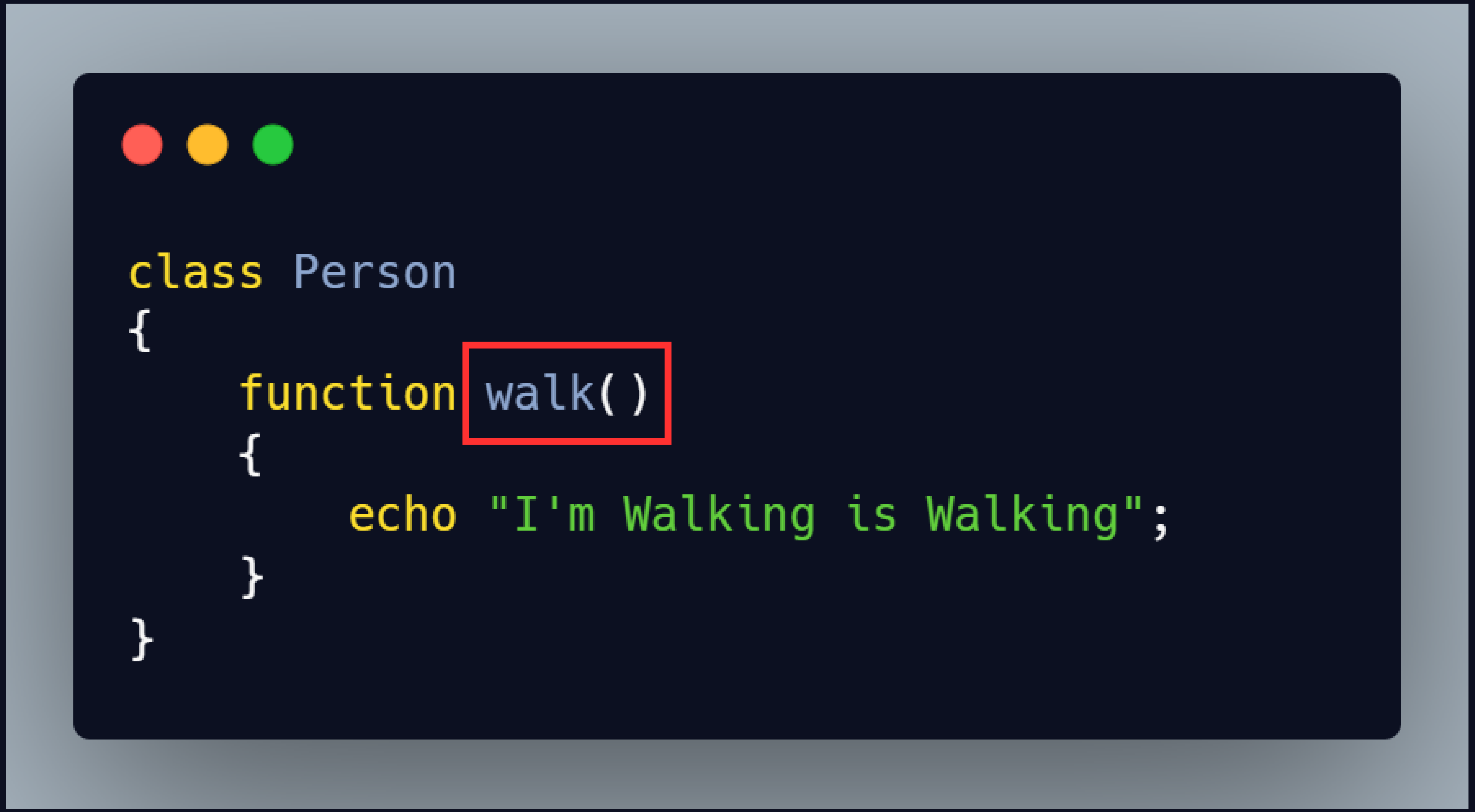
```
class Teacher extends Person
{

   // I Take The Constructor From My Parent

}
$teacher1 = new Teacher(); // Welcome
```



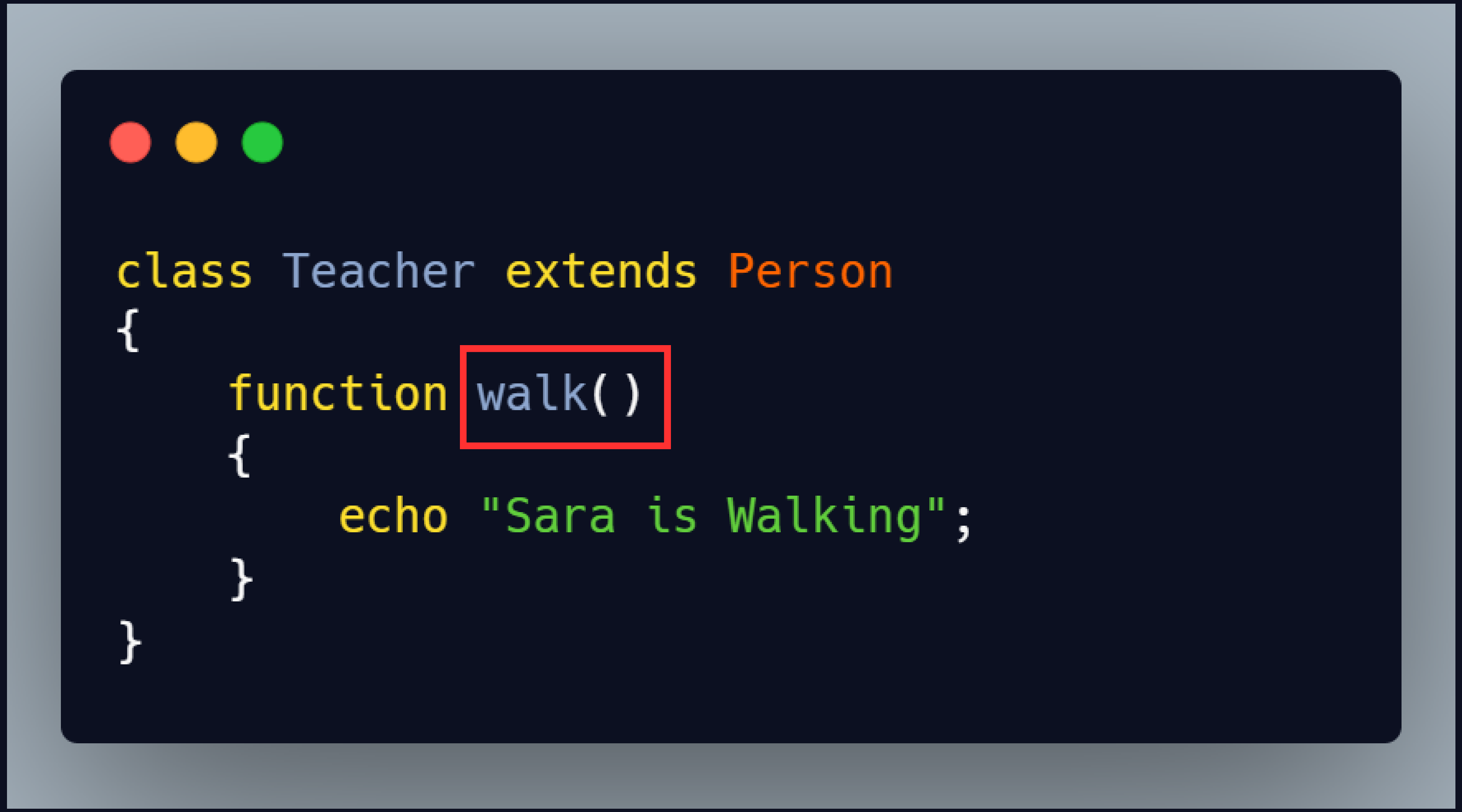
```
class Teacher extends Person
{
    // I Override My Parent Constrcutor
   function __construct()
   {
       echo "Teacehr";
   }
}
$teacher1 = new Teacher(); // Teacehr
```

What is Overriding ?

- The method must have the same name as in the parent class
- The method must have the same parameter as in the parent class.
- There must be an IS-A relationship (inheritance).



```
class Person
{
    function walk()
    {
        echo "I'm Walking is Walking";
    }
}
```

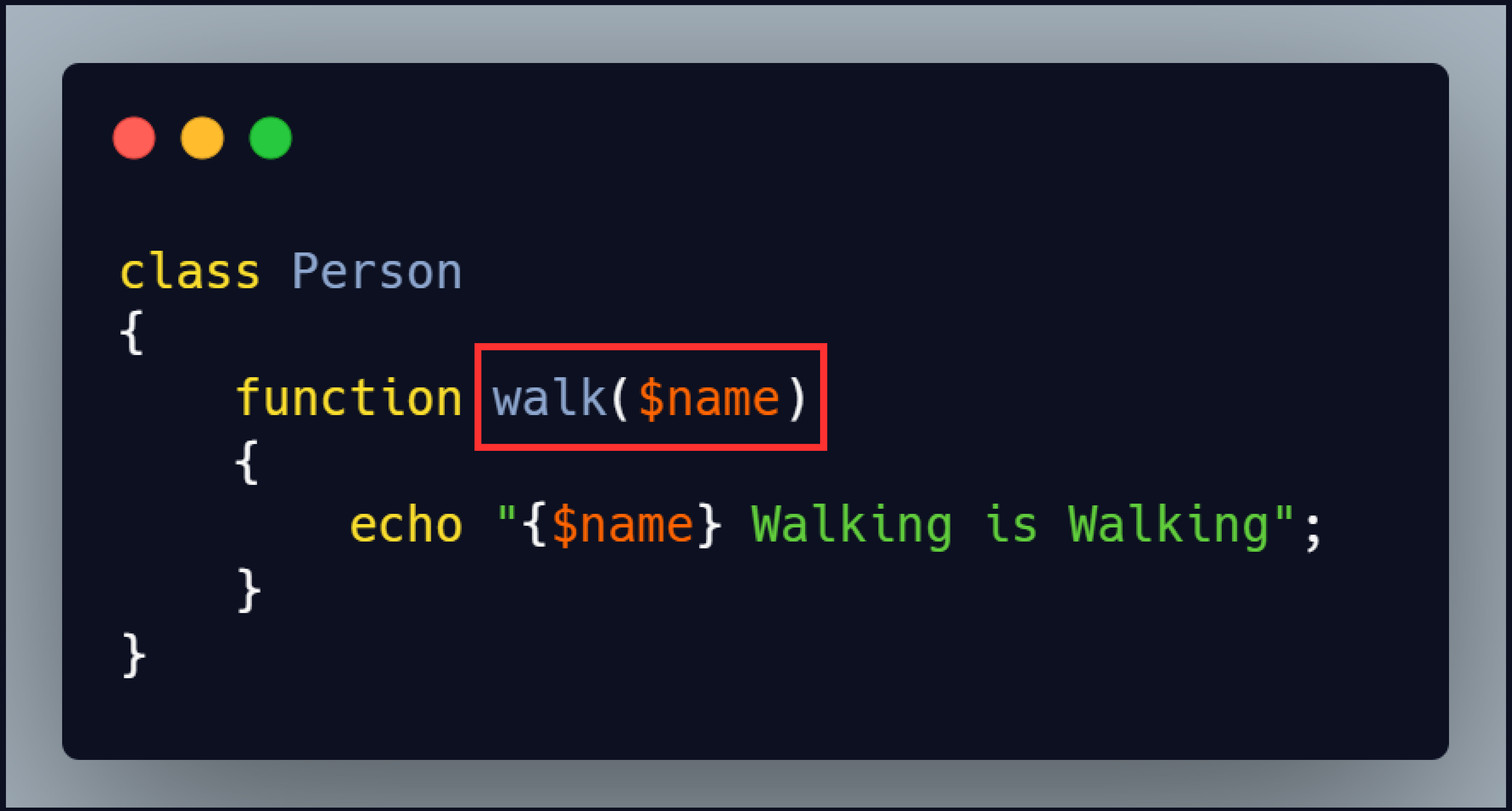


```
class Teacher extends Person
{
    function walk()
    {
        echo "Sara is Walking";
    }
}
```

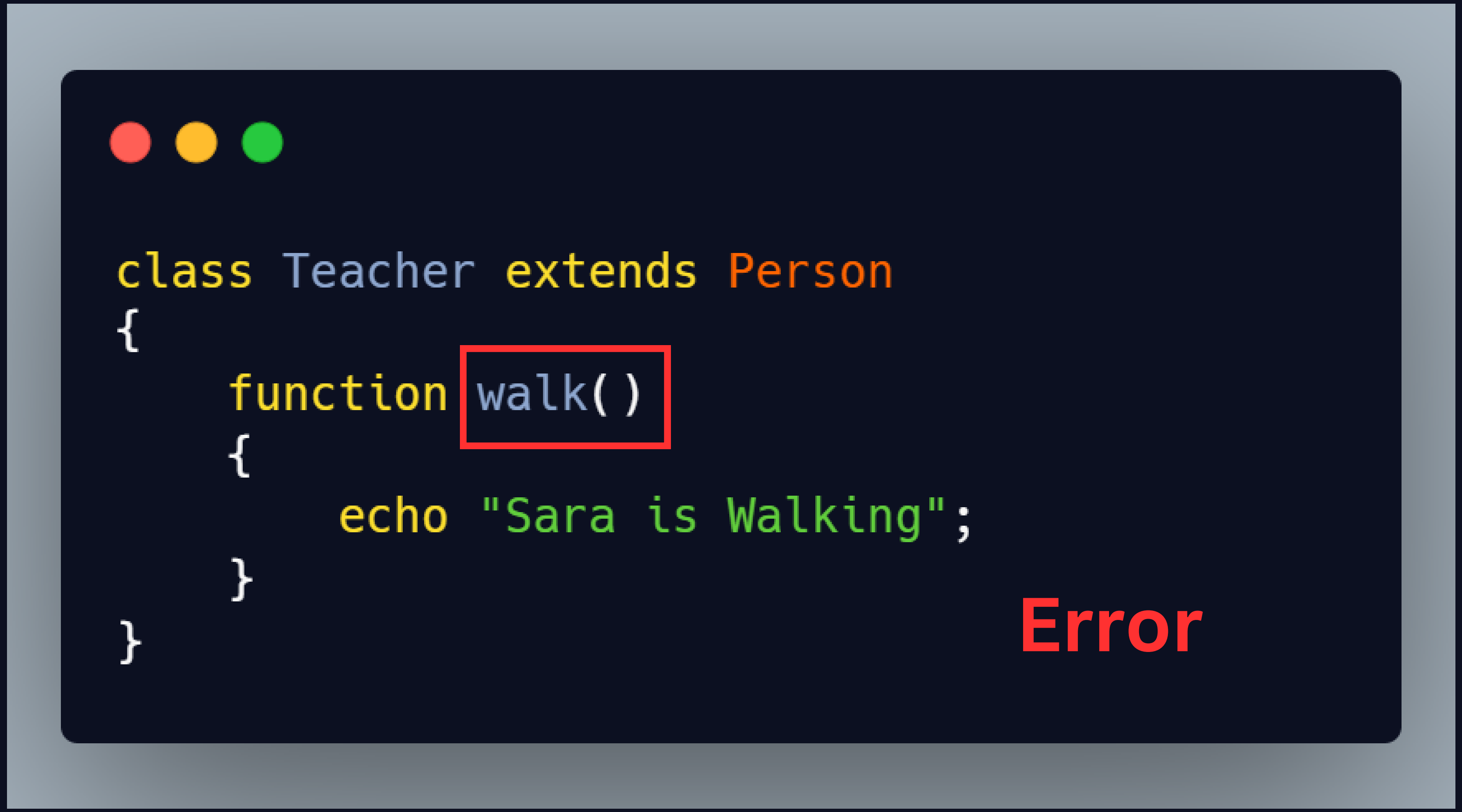
Overriding Con...

The method must have the same parameter as in the parent class.

How Can I Prevent Overriding



```php
class Person
{
    function walk($name)
    {
        echo "{$name} Walking is Walking";
    }
}
```



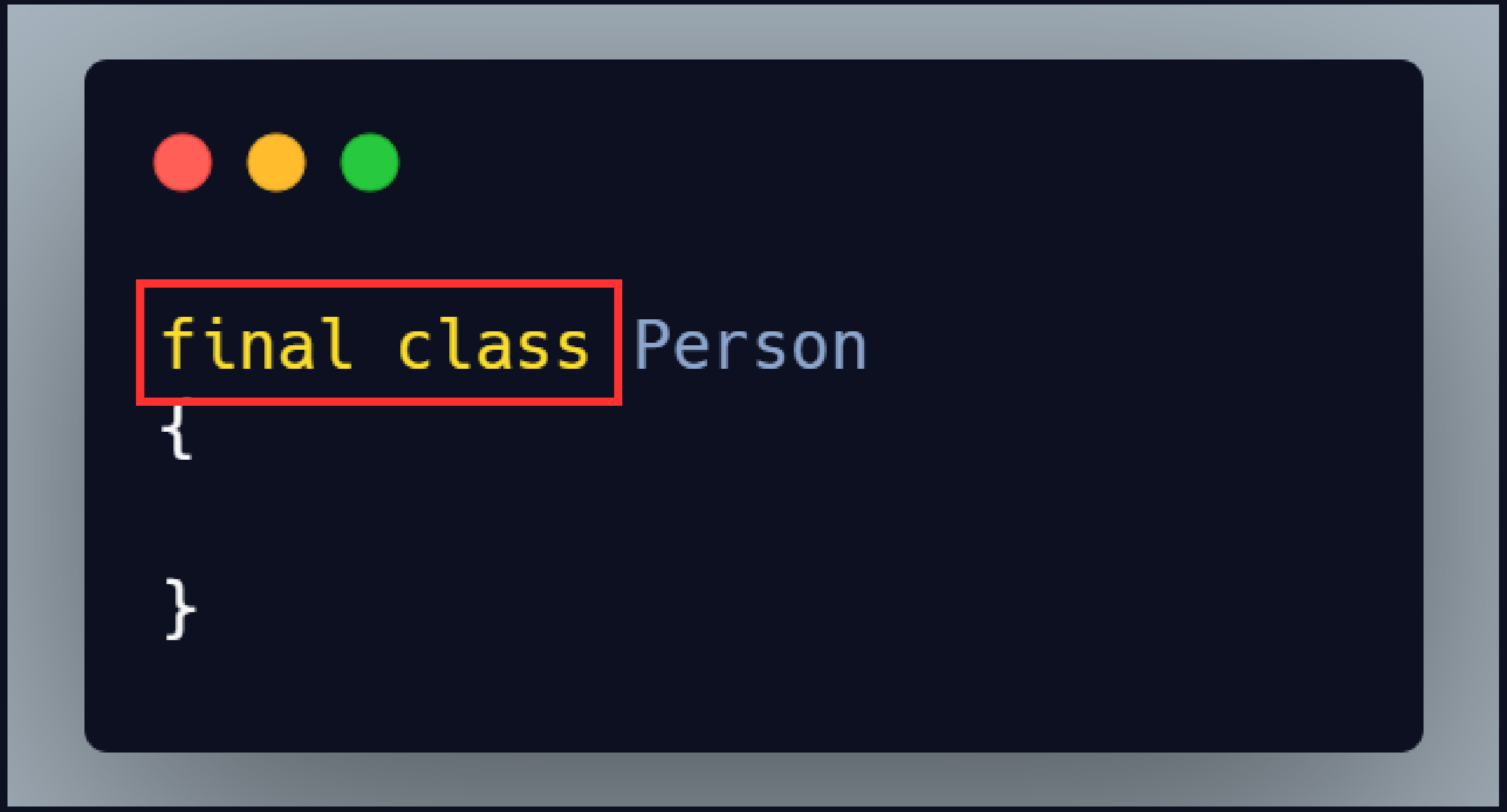
```php
class Teacher extends Person
{
    function walk()
    {
        echo "Sara is Walking";
    }
}
```

Error

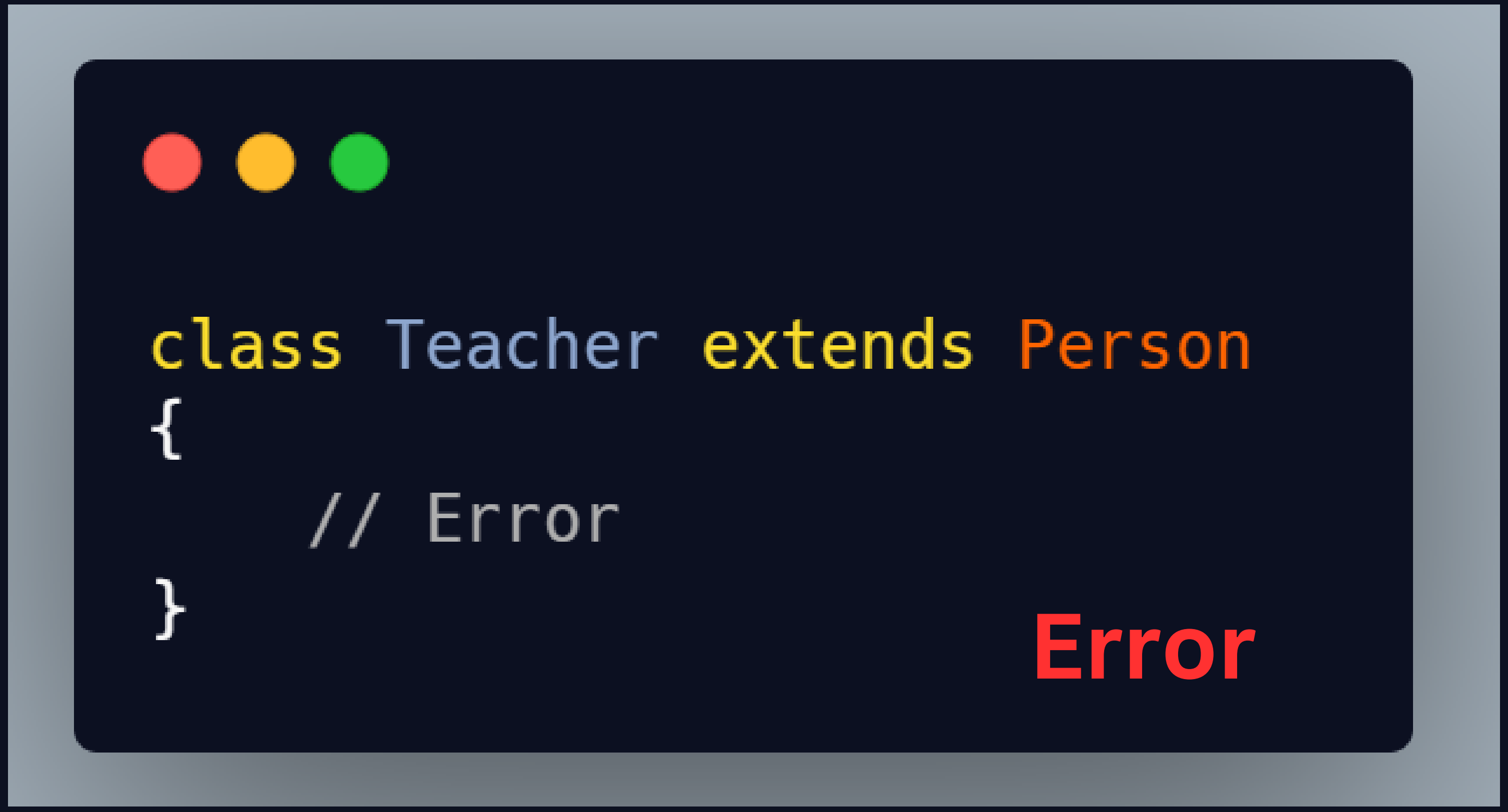
Final Keyword

- By Using Final Keyword U can Prevent Overriding and Inheritance

Prevent Inheritance



```
final class Person
{

}
```



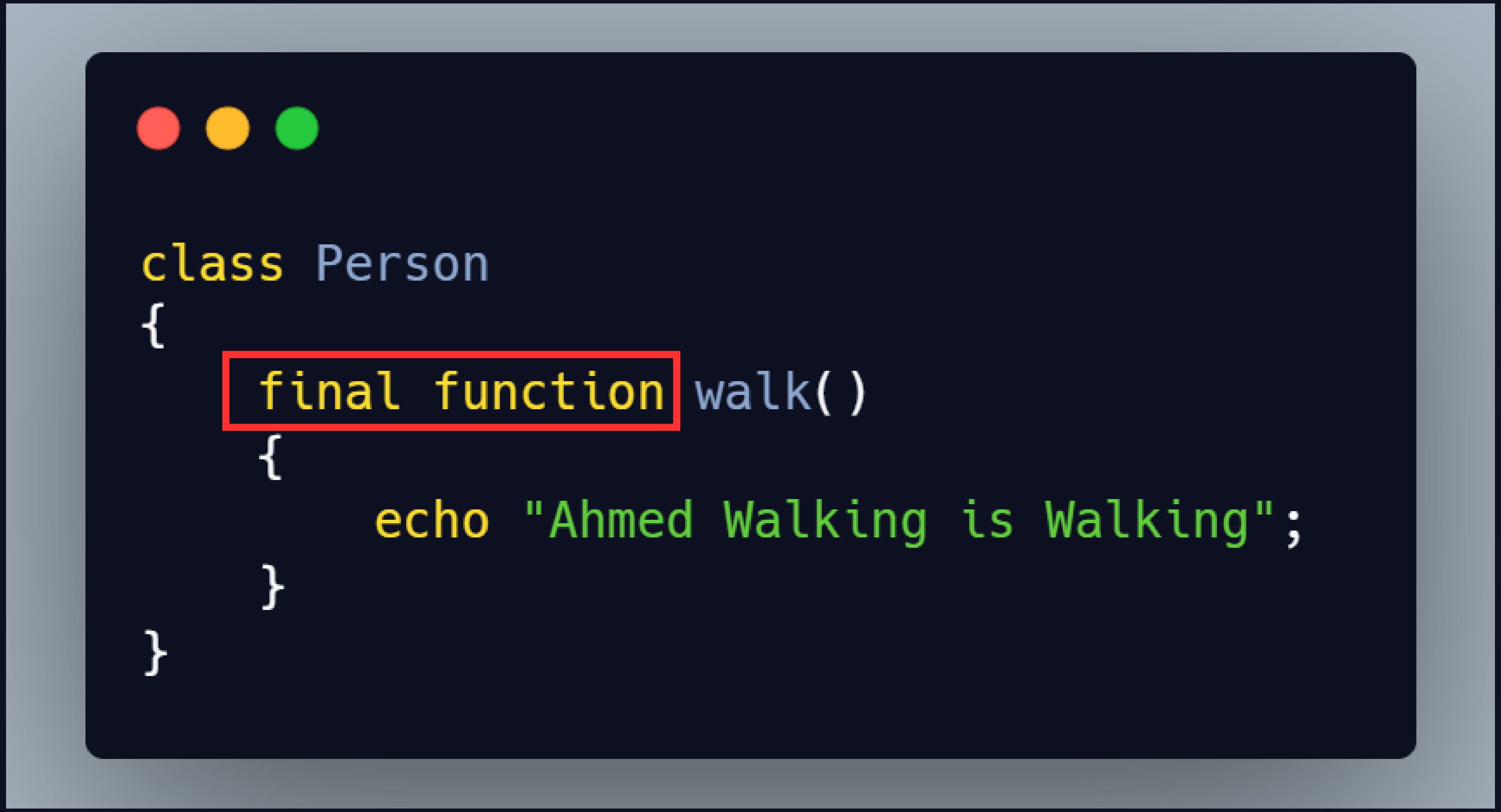
```
class Teacher extends Person
{
     // Error
}
```

Error

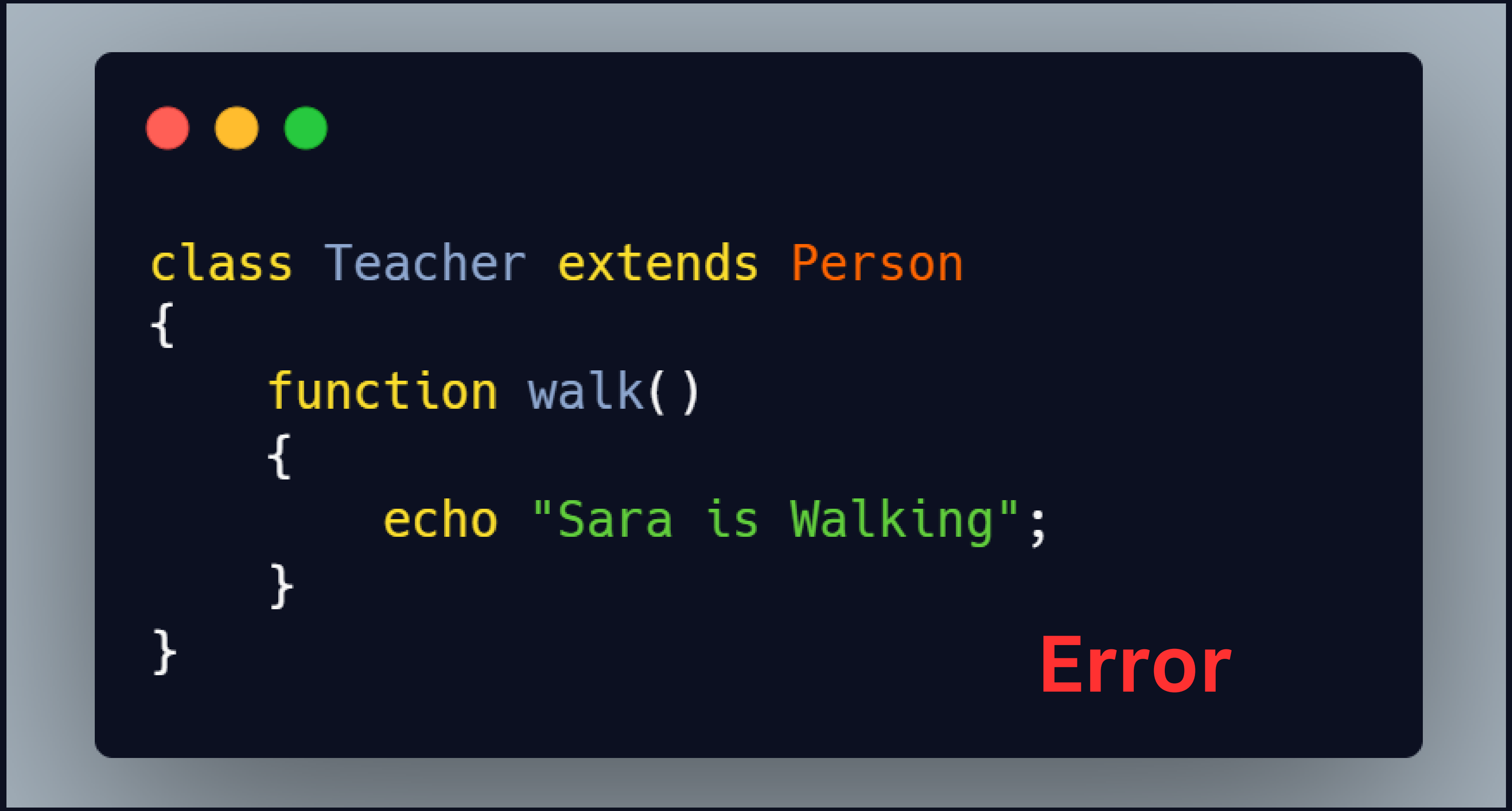
Final Keyword

- By Using Final Keyword U can Prevent Overriding and Inheritance

Prevent Overriding



```
class Person
{
    final function walk()
    {
        echo "Ahmed Walking is Walking";
    }
}
```



```
class Teacher extends Person
{
    function walk()
    {
        echo "Sara is Walking";
    }
}
```

Error

Composition

Composition

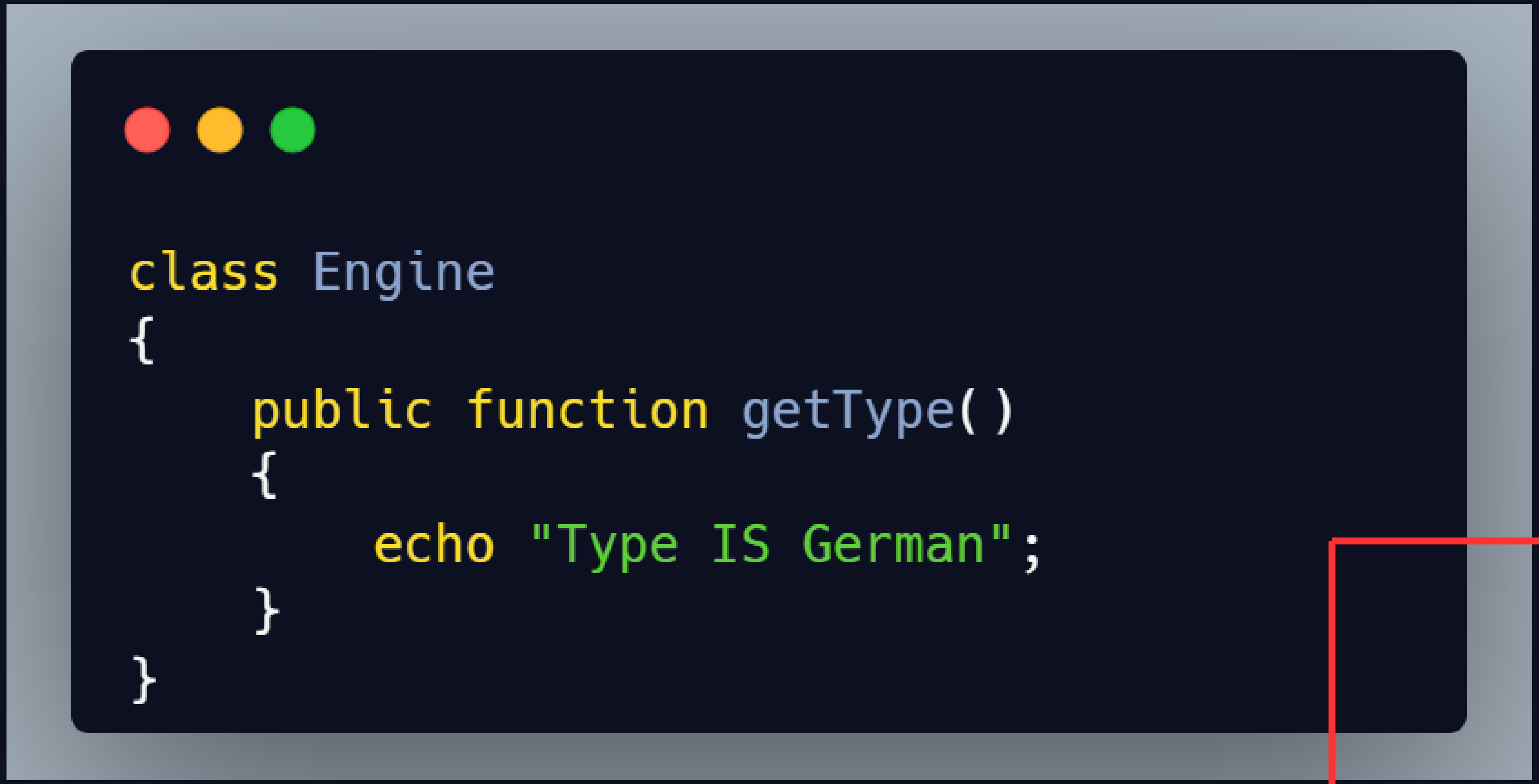
- Composition is concept in object-oriented programming to implement has-a relationship between objects.
- Composition involves using other classes to build more complex classes and there is no parent/child relationship exists in this case.
- There are two types of composition : association and aggregation. Both types of composition include a **has-a** relationship

Example

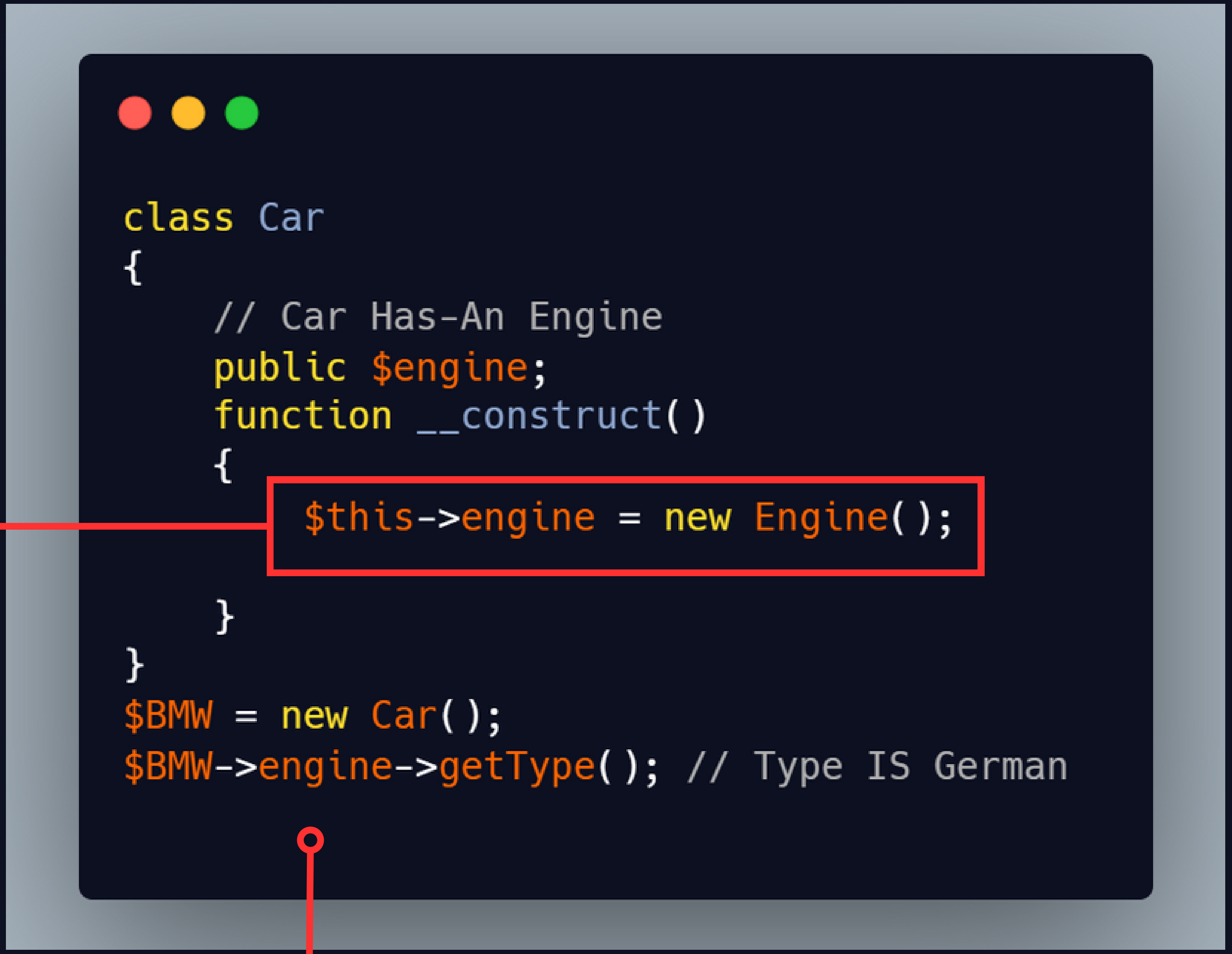
Consider the computer as an object. Computer has-a motherboard, keyboard, speaker, etc. Composed objects also can be composed of other objects. For example, motherboard has-a RAM, CPU, ect

Object

Code



```
class Engine
{
    public function getType()
    {
        echo "Type IS German";
    }
}
```

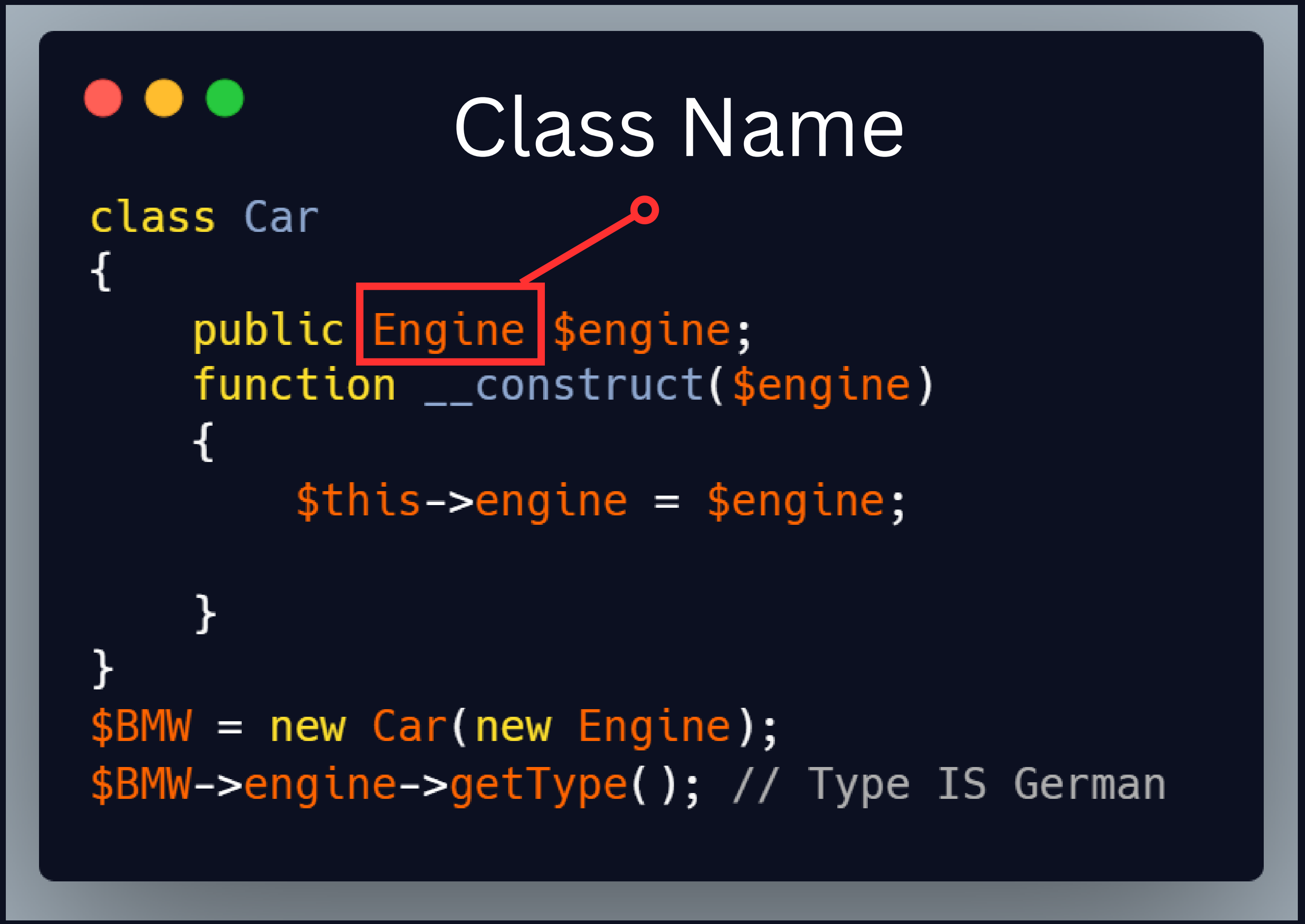


```
class Car
{
    // Car Has-An Engine
    public $engine;
    function __construct()
    {
      $this->engine = new Engine();

    }
}
$BMW = new Car();
$BMW->engine->getType(); // Type IS German
```

As Soon As You Create Object
From Car Make A composition
With Engine

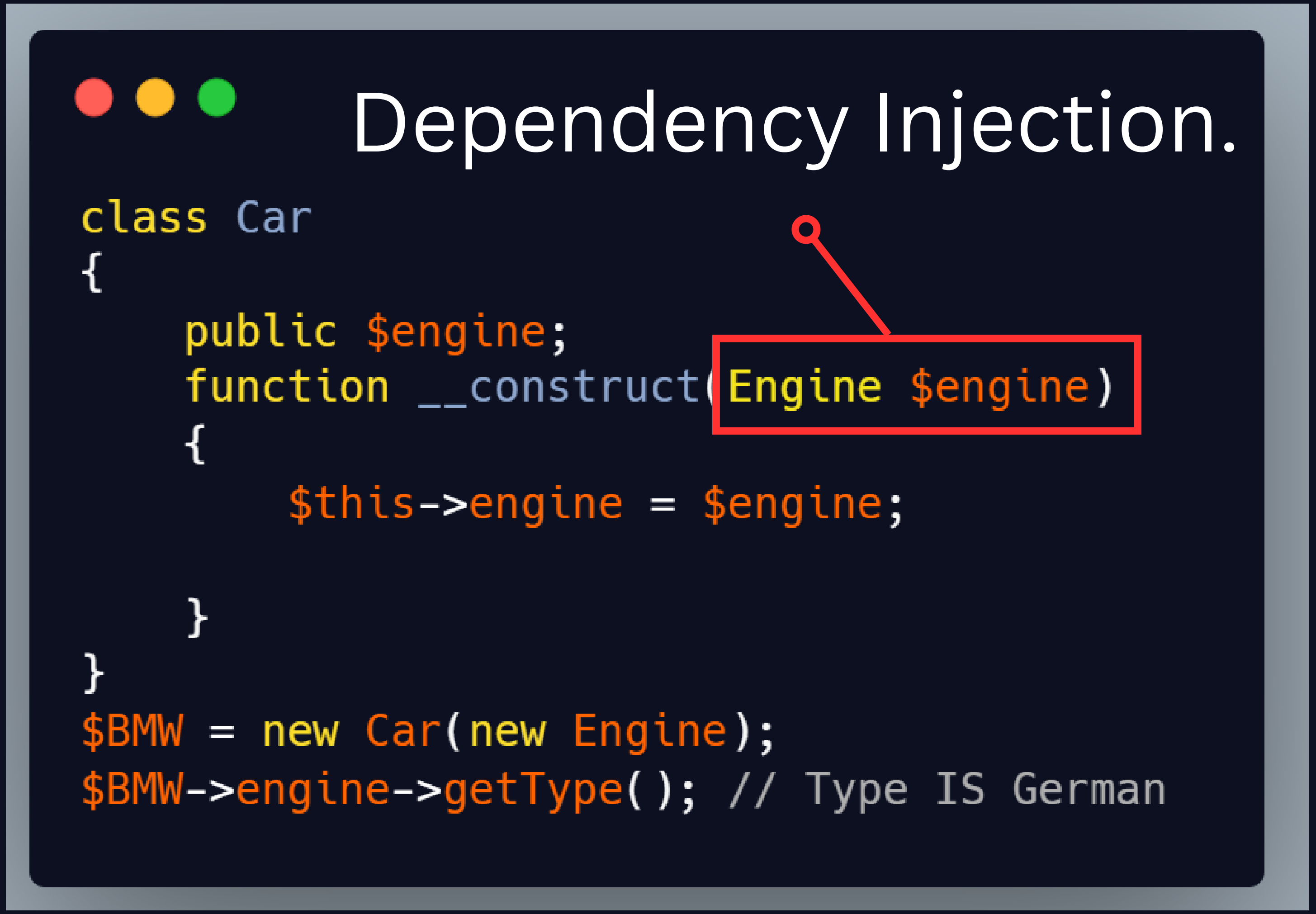
Object Of Type Engine

Others Ways To Code



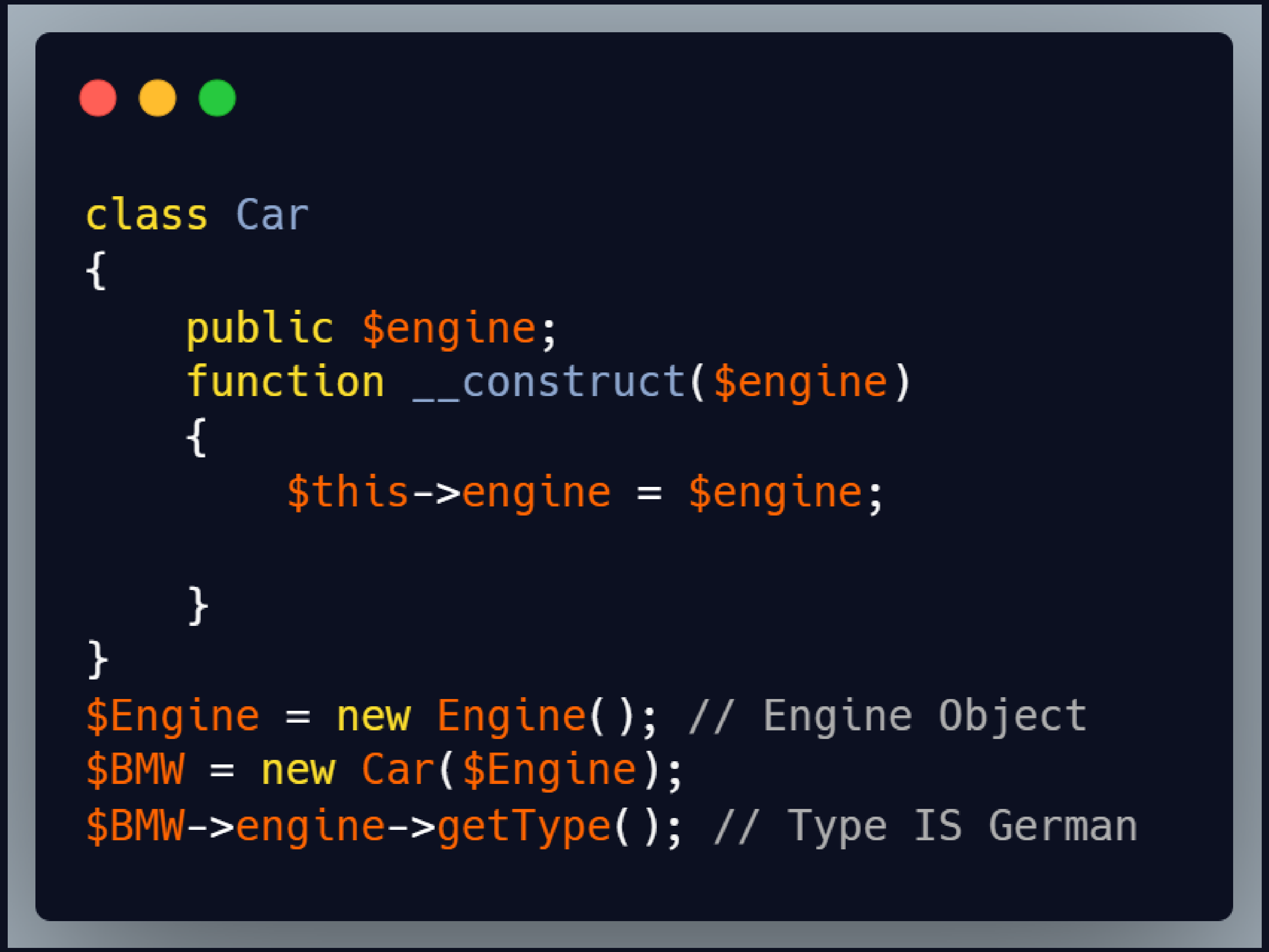
Class Name

```
class Car
{
     public Engine $engine;
     function __construct($engine)
     {
          $this->engine = $engine;

     }
}
$BMW = new Car(new Engine);
$BMW->engine->getType(); // Type IS German
```



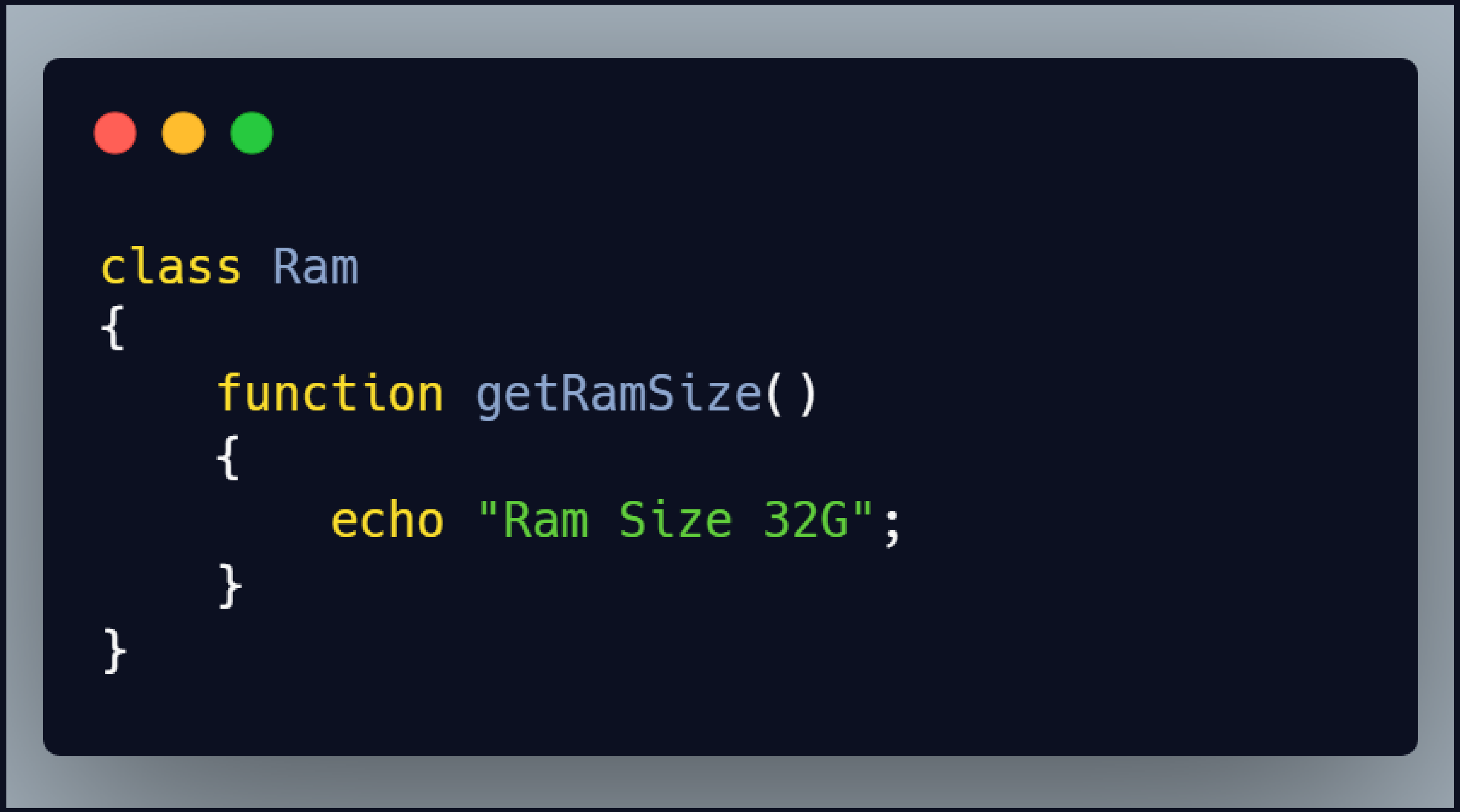
Dependency Injection.

```
class Car
{
     public $engine;
     function __construct(Engine $engine)
     {
          $this->engine = $engine;

     }
}
$BMW = new Car(new Engine);
$BMW->engine->getType(); // Type IS German
```

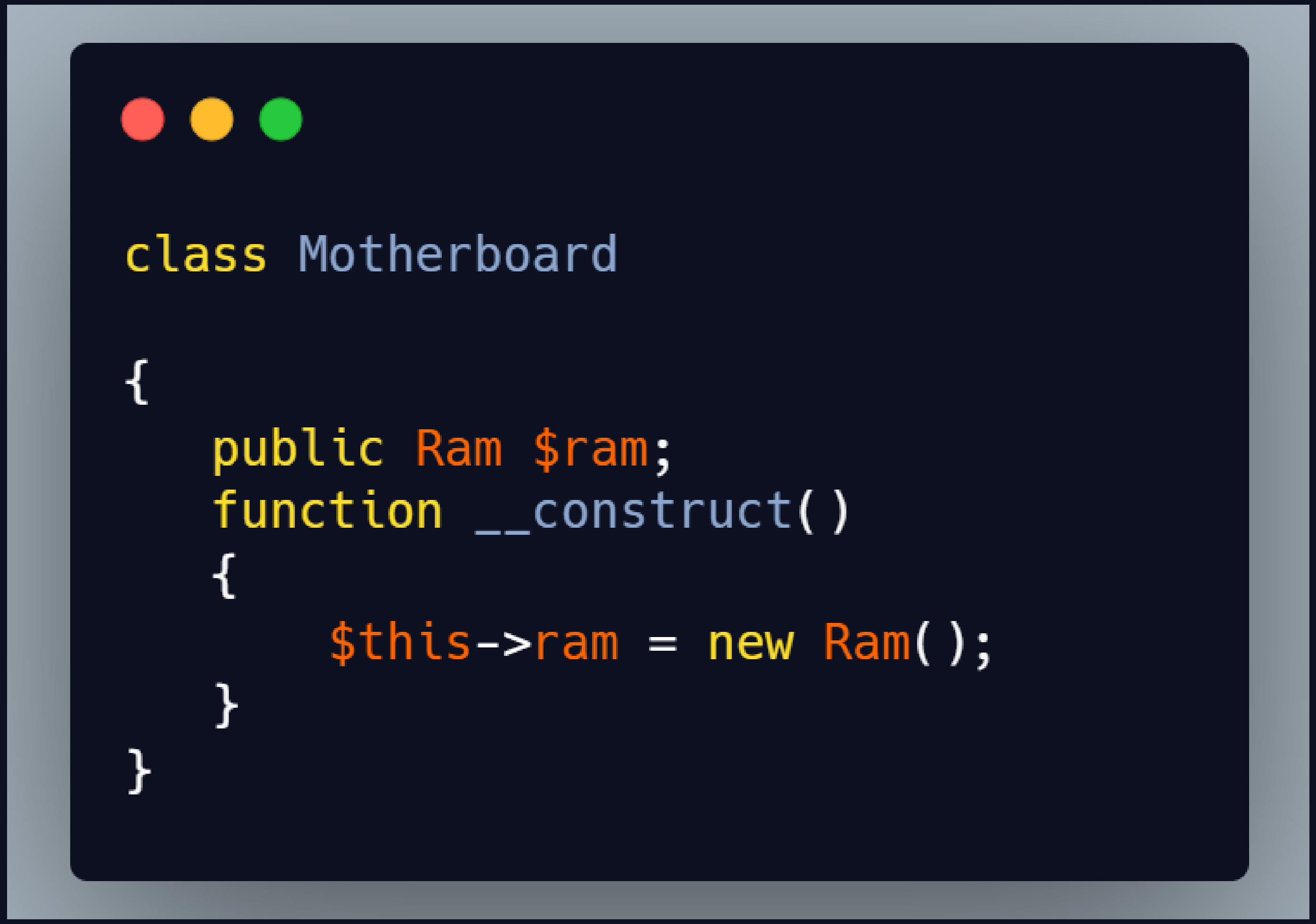


```
class Car
{
     public $engine;
     function __construct($engine)
     {
          $this->engine = $engine;

     }
}
$Engine = new Engine(); // Engine Object
$BMW = new Car($Engine);
$BMW->engine->getType(); // Type IS German
```

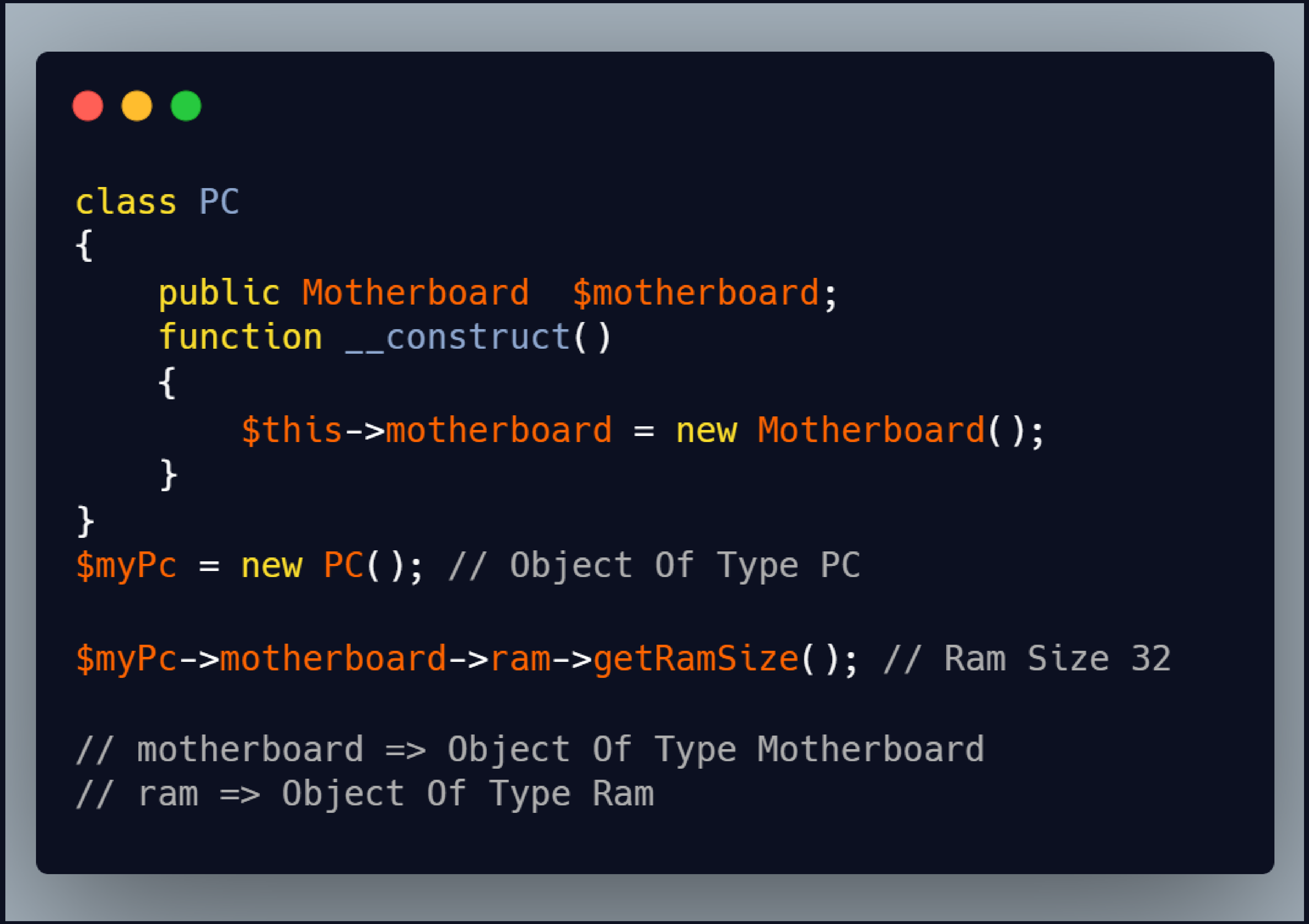
More Complex Example



```php
class Ram
{
    function getRamSize()
    {
        echo "Ram Size 32G";
    }
}
```



```php
class Motherboard

{
   public Ram $ram;
   function __construct()
   {
       $this->ram = new Ram();
   }
}
```



```php
class PC
{
    public Motherboard  $motherboard;
    function __construct()
    {
        $this->motherboard = new Motherboard();
    }
}
$myPc = new PC(); // Object Of Type PC

$myPc->motherboard->ram->getRamSize(); // Ram Size 32

// motherboard => Object Of Type Motherboard
// ram => Object Of Type Ram
```

Task Search

Favor Composition over Inheritance. Why ?

Dependency Injection.

Does PHP Has Multi Inheritance ?. How Can Do That ?

Resources

- https://medium.com/geekculture/oop-series-composition-6c67a19cabd1
- https://www.koderhq.com/tutorial/php/oop-composition/#how-to-associate-through-composition
- https://www.amitmerchant.com/reasons-use-composition-over-inheritance-php/
- https://www.digitalocean.com/community/tutorials/composition-vs-inheritance

Quote

The most disastrous thing that you can ever learn is your first programming language

Alan Kay

Thank You

Abdelrahman Abdullah