King Abdul Aziz University

Faculty of Computing and Information Technology

Department of Computer Science

Senior Project CPCS-499

Developing an Online Developers Community& auto UML Generator (Report-II)

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Summary of previous work

Aim of the project

The aim of this project is to create an application which is an online community for developers. This online community will allow the users to share, ask their ideas or UML diagram by generating UML diagram from the source code automatically. In the future, this project will allow to all types of OOP (Objected-Oriented Programming) languages to generate their UML source code.

Problem definition

This project is an online software application which focuses on creating an auto UML generator to convert the PHP 5.0 source code into UML diagram. In the future, it can be expanded easily, due to providing such a platform for other languages as well, such as (Java, C++, and other languages that support OOP concept). The problem is, in developing a PHP parser to extract all the Class and Interface information from the source code and finding the solution on how to illustrate the extracted information into diagram by using HTML5 Canvas that could be easier to understand for the user. Also, another part of the problem is to create such a platform to allow users to create a specific group where the developers can share and ask the ideas on a specific topic such as a group for PHP where PHP developers can join and chat with each other about specific PHP topic.

Project scope

The scope of this project is to:

- Create an auto UML generator from PHP 5.0 source code
- Creating a special communication tool for developers
- Make a platform for future extension of auto UML diagram for other OOP (Object Oriented Programming) languages

Expected outcome

A full responsive web application that can generate UML diagram from PHP 5 source code, the users can download, share and interact with the generated UML diagram. Besides, the application provides a special communication tool for developers where they could find a specific group and join it for discussion.

Target Users

The target users of this application are the software developers, but in general, anyone can use it for his or her own purpose of generating UML diagram from PHP source code and to communicate with other developers.

Suggested solution

- Creating a PHP syntax parser for extracting class and interface details from the source code
- Using HTML5 Canvas to draw the extracted information from the PHP source code into visually UML diagram
- Creating the application interface for the chat application

Functional Requirements

- Generate UML diagram
- Download generated UML diagram
- Share generated UML diagram
- Create new group
- Ranking the group
- Putting group in favorite list
- Remove group from favorite list
- Register new account / Sign in account
- Search community
- Send & receive message on chatroom

Non-Functional Requirements

- Response time
- Throughput
- Reliability
- Maintainability

Data Requirements
The user should upload the files which contain the PHP source code, which through the uploaded source code, the UML diagram will be generated.

Implementation Languages
- PHP
- MySQL
- JavaScript
- jQuery libraries
- HTML
- CSS

Software
- NetBeans 8.2
- Windows 10
- XAMP Server (PHP and MySQL compiler)
- Chrome Browser

Methods and Approaches

Planning
I planned for the project by using the **work break down structure** (WBS), scheduled the project by Gantt chart & time estimates to manage & organize my work in order to complete the project.

Analysis
At First, I tackled the analysis and parsing part of PHP syntax analyzer and figure out how to design and implement it to extract the Class and Interface information from the PHP files. The compiler course which I took last year, really helped me in this part of the project.
Second, I figured out about the illustration part of the UML diagram on the client side (Web Browser), which is the most important and difficult part of this project. The generated UML diagram will be illustrated in the browser so, therefore, I planned to make use of HTML 5 Canvas to convert the extracted information from the source code into UML diagram in the client side.
Third, it's the application's user interface part (GUI) and also figure about the chat application part which is about creating the database for the entire application.

Design

I designed the flow chart, use case diagram and class diagram for this project which you can see on the above section of this page.

Implementation

This project is an application which is an implementation based project, therefore I started coding the project and there are 3 parts in coding the coding section:

1. Implementation of the PHP syntax parser.
2. Implementation of the UML illustration part by HTML 5 Canvas.
3. Implementation of Chat Application.
4. Implementation of home page
5. Implementation of profile & profit pages
6. Implementation of creating new community or group page

Maintenance

After completing the code, I will test the program in order to remove the errors.

Activities and Actions

Use Case Diagram

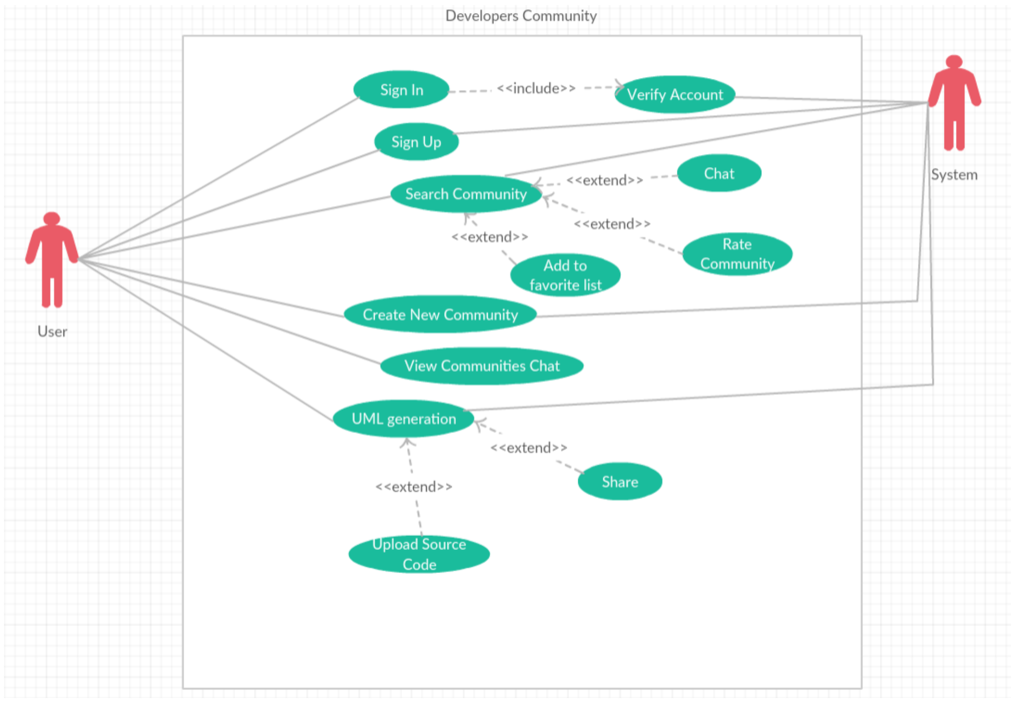


Figure 1this use case shows how the application works

Flow Chart

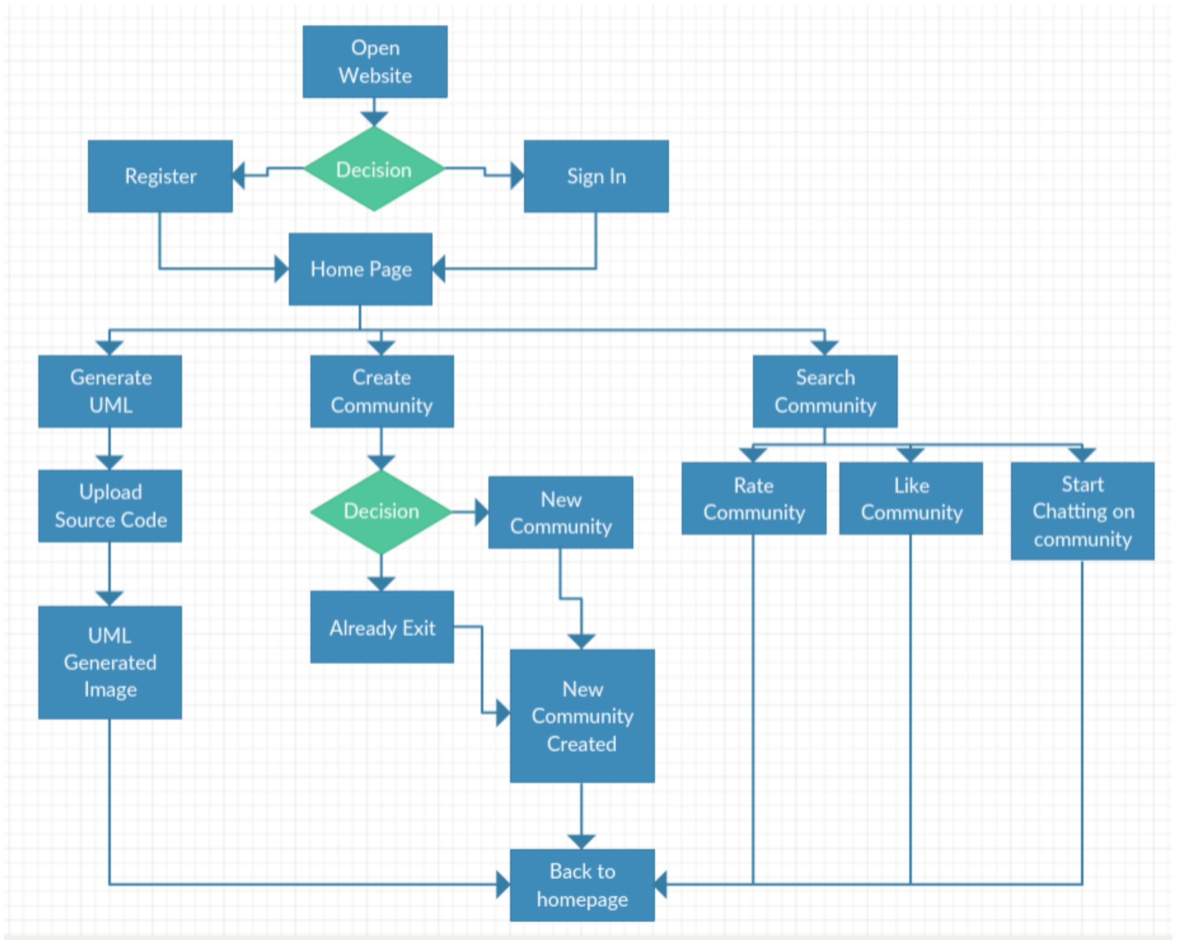


Figure 2 this flow chart explains how the entire system will work

Class Diagram

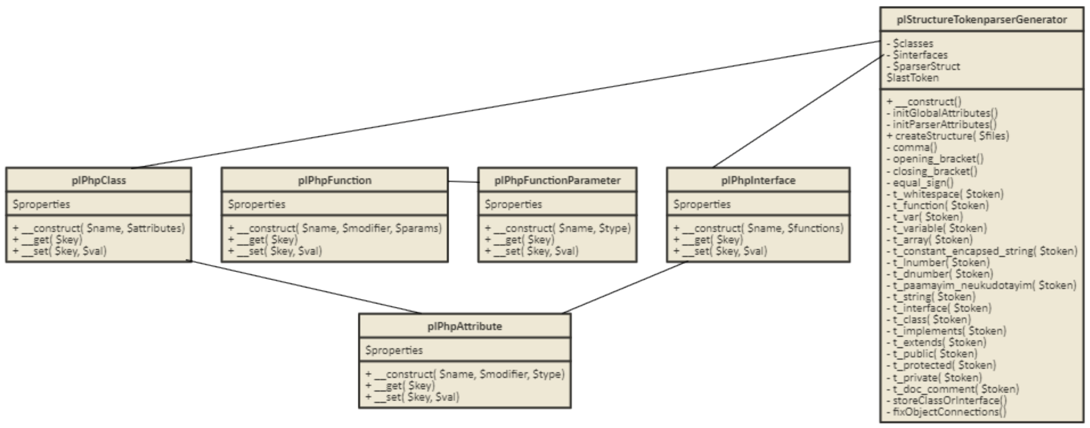


Figure 3 shows the PHP syntax parser's class diagram

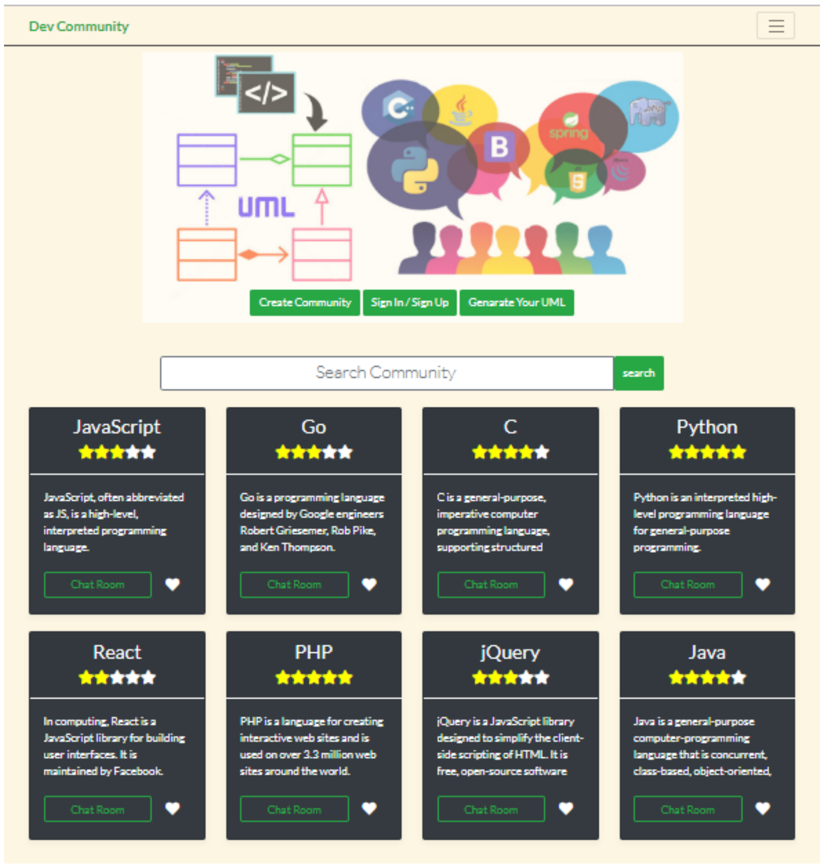
Tasks Completed

- PHP syntax parser.
- Printing UML diagram from source code
- Generating UML diagram from source code
- Chat Application
- Searching Community
- Creating, editing user account

Interface

Here are some of the interface of the project.

1. **The Main Page**: In the main page, there are many options for the users to navigate the entire application. Such as, searching a specific group, entering to a specific group's chat room, creating a new group, putting a specific group into favorite list, signing in/up, and the most important one, generating UML diagram.



JavaScript

JavaScript, often abbreviated as JS, is a high-level, interpreted programming language.

Go

Go is a programming language designed by Google engineers Robert Griesemer, Rob Pike, and Ken Thompson.

C

C is a general-purpose, imperative computer programming language, supporting structured

Python

Python is an interpreted high-level programming language for general-purpose programming.

React

In computing, React is a JavaScript library for building user interfaces. It is maintained by Facebook.

PHP

PHP is a language for creating interactive web sites and is used on over 3.3 million web sites around the world.

jQuery

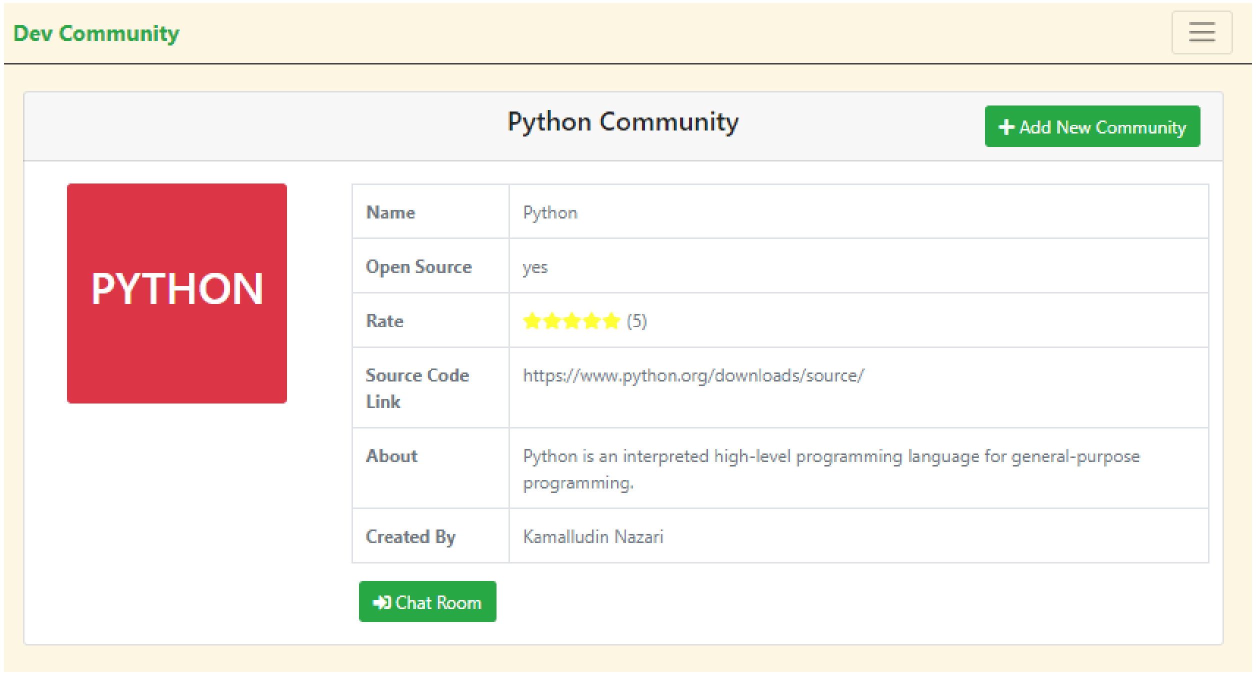
jQuery is a JavaScript library designed to simplify the client-side scripting of HTML. It is free, open-source software

Java

Java is a general-purpose computer-programming language that is concurrent, class-based, object-oriented,

Figure 4 shows the main page of the application

2. **Community Information Page**: this page is to get an overall information about a specific group (language/library) and it also allows the user to rate it or to join the chatroom.



Name	Python
Open Source	yes
Rate	★★★★★ (5)
Source Code Link	https://www.python.org/downloads/source/
About	Python is an interpreted high-level programming language for general-purpose programming.
Created By	Kamalludin Nazari

Figure 5 shows the community info page

3. **Sign in/up page**: this page is to let the user to log in or to register a new account in the system.

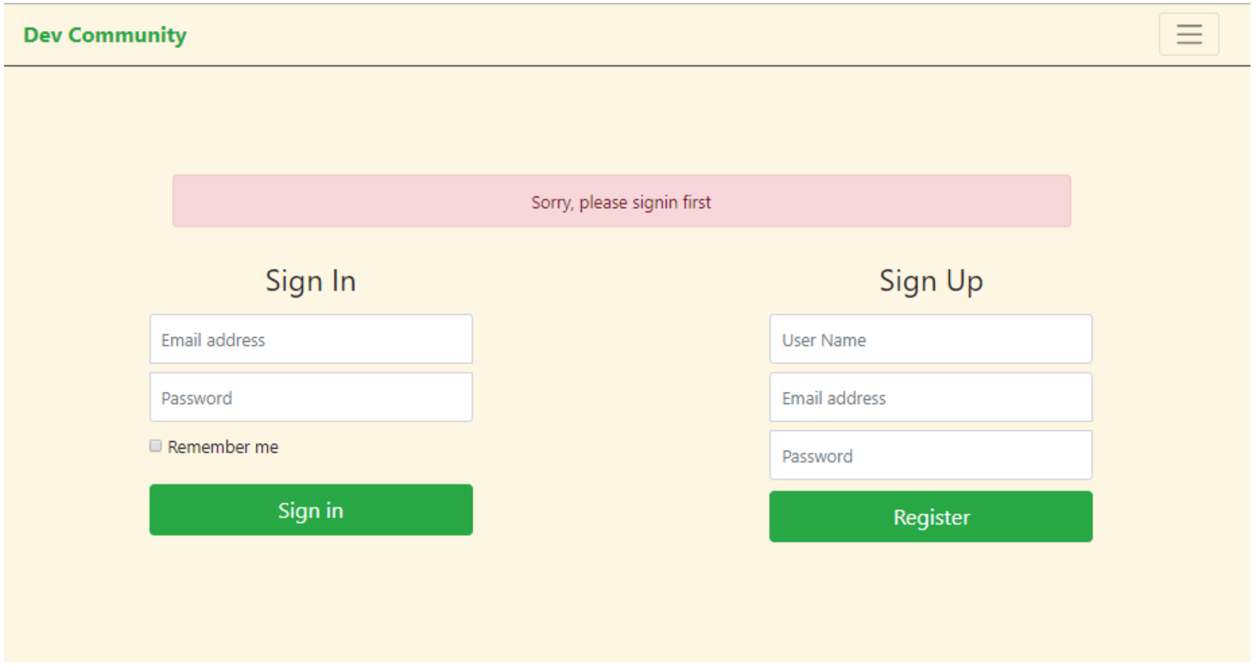
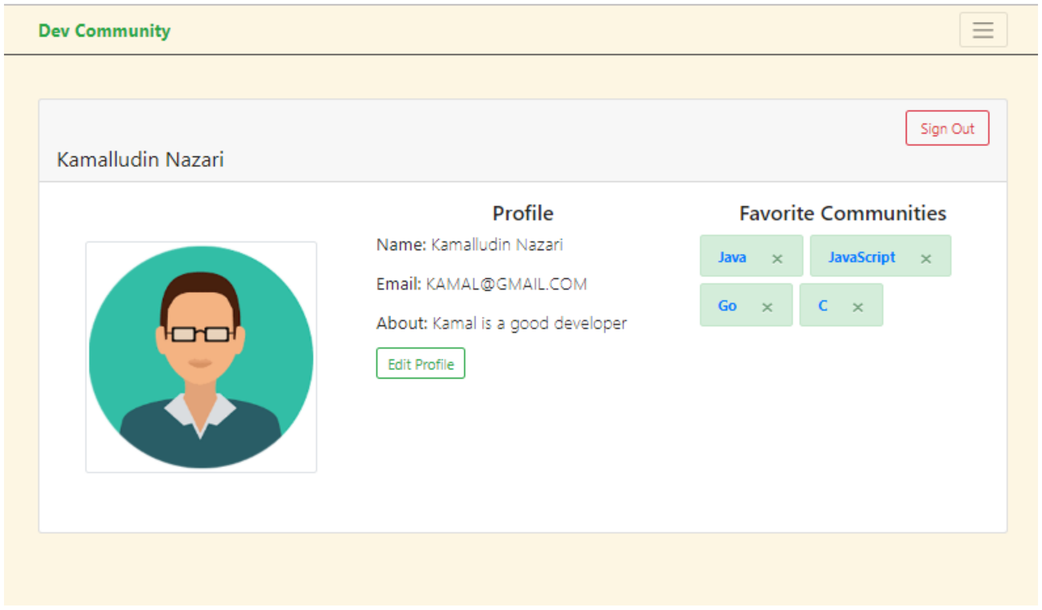


Figure 6shows the sign in and register page

4. **Profile page**: the profile page is to visit the profile page of the user. The user can see his/her favorite group list and also he/she can edit his profile information such as email, password, details and profile pic.



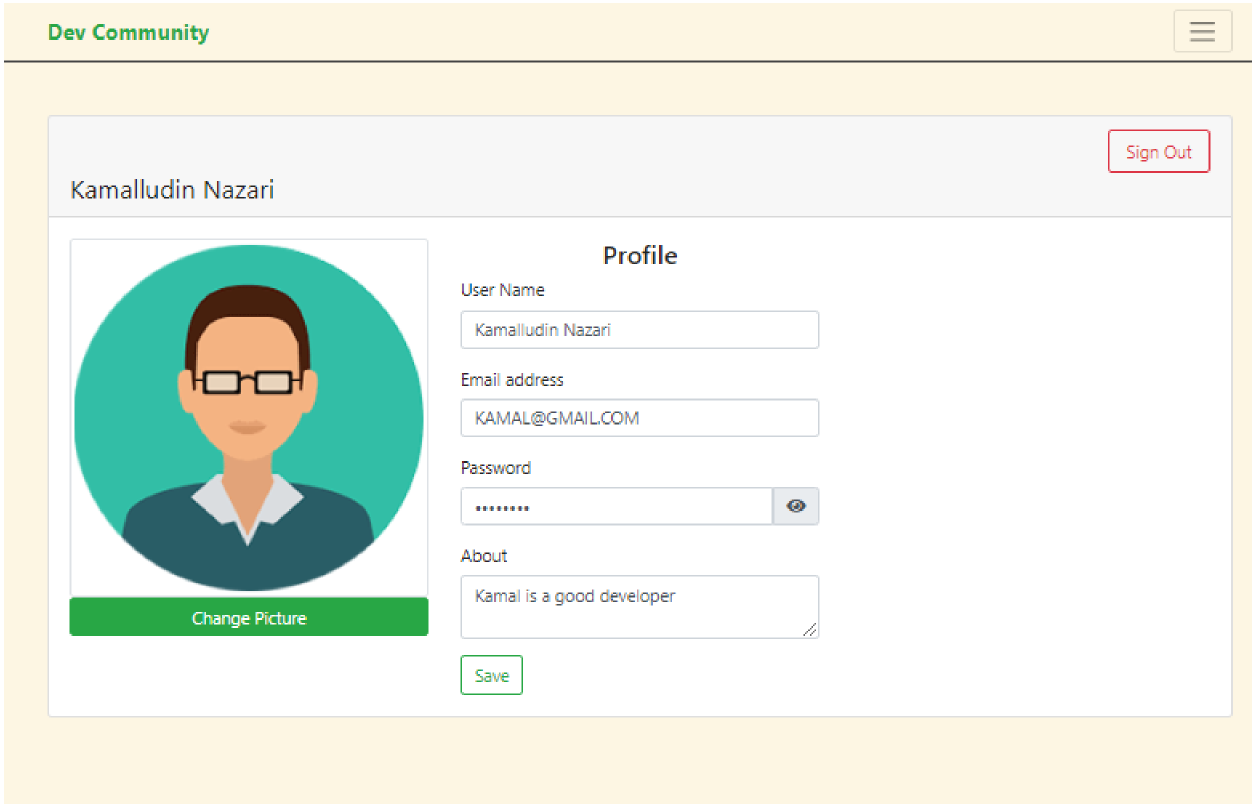
Name: Kamalludin Nazari

Email: KAMAL@GMAIL.COM

About: Kamal is a good developer

Figure 7shows the user profile information

5. **Profile Edit page**: If the user wants to bring some changes to his/her profile, he can go to this page and edit his profile info. Note that only the authorized users can edit his profile.



User Name: Kamalludin Nazari

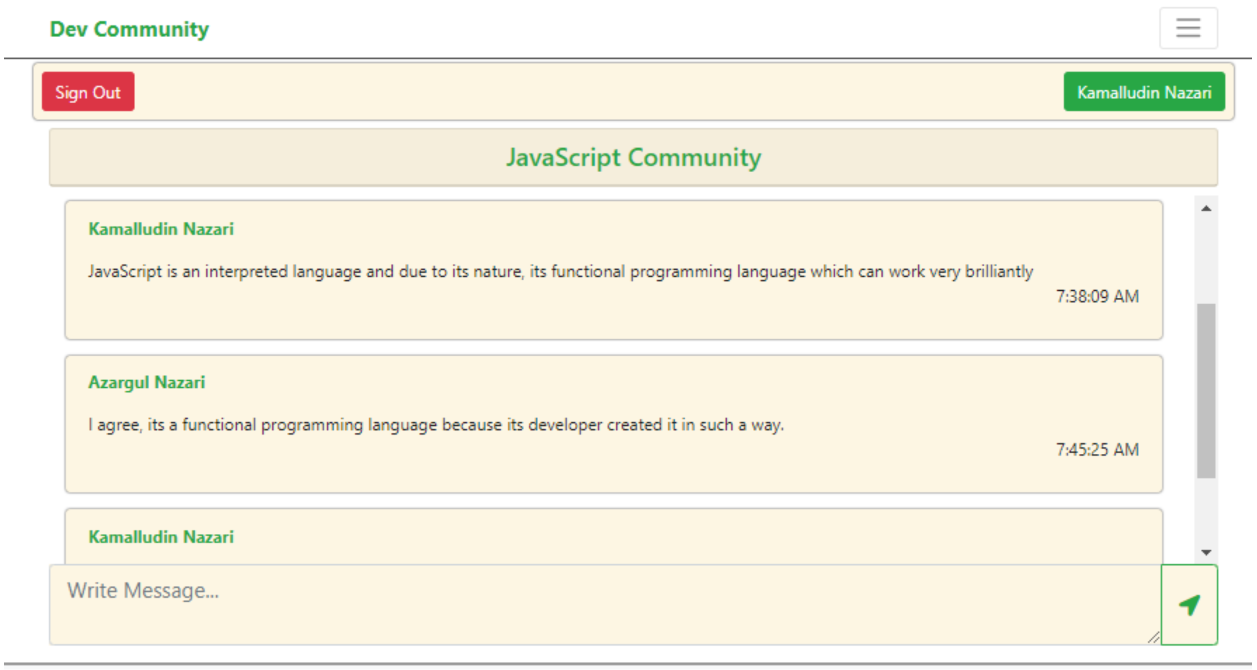
Email address: KAMAL@GMAIL.COM

Password: ••••••••

About: Kamal is a good developer

Figure 8 shows the profile edit page

6. **Group chatroom page**: this page is to let the developers to chat in the same group which they can send messages on the group.



Kamalludin Nazari

JavaScript is an interpreted language and due to its nature, its functional programming language which can work very brilliantly

7:38:09 AM

Azargul Nazari

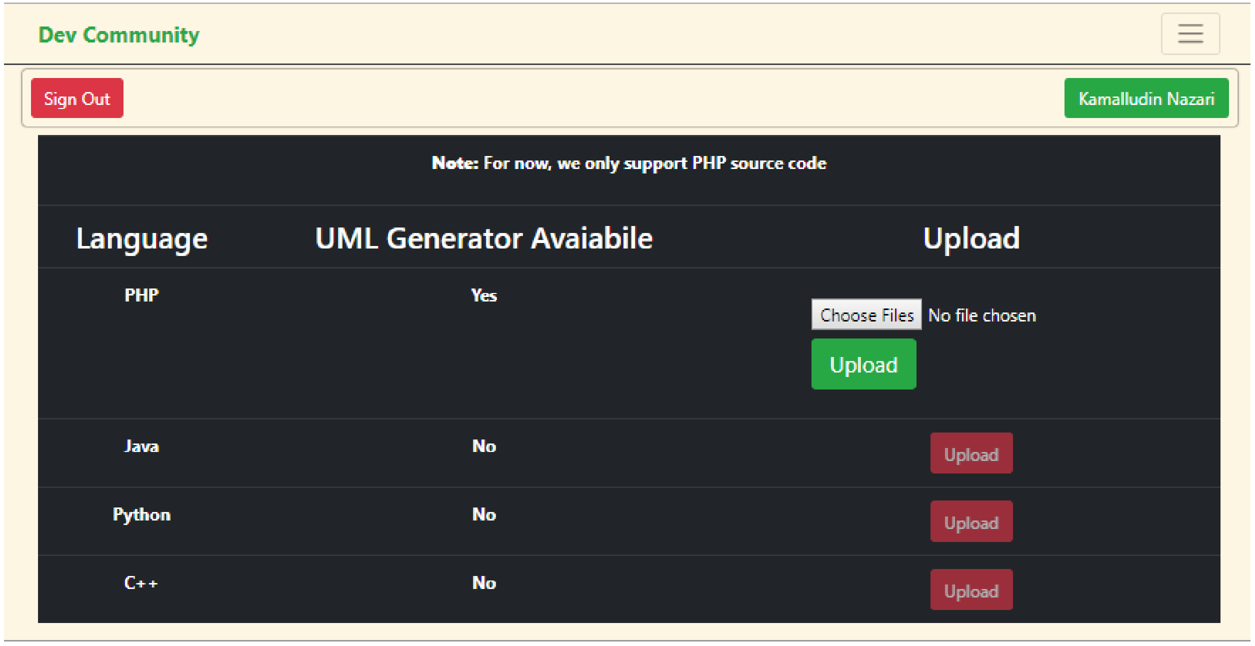
I agree, its a functional programming language because its developer created it in such a way.

7:45:25 AM

Kamalludin Nazari

Figure 9 shows the chat room for the JavaScript Community

7. **Upload file page:** The upload page is to let the users to upload PHP files for generating their UML diagram.



Note: For now, we only support PHP source code

Language	UML Generator Avaiabile	Upload
PHP	Yes	Choose Files No file chosen Upload
Java	No	Upload
Python	No	Upload
C++	No	Upload

Figure 10 Shows the PHP file upload page

8. **UML Generator page**: To see the result of uploaded PHP files or simple to see the UML diagram which the user uploaded on the previous diagram, they can see it on this page, after uploading process is done. The user can zoom in/out, download UML image, or to share the link with other developers.

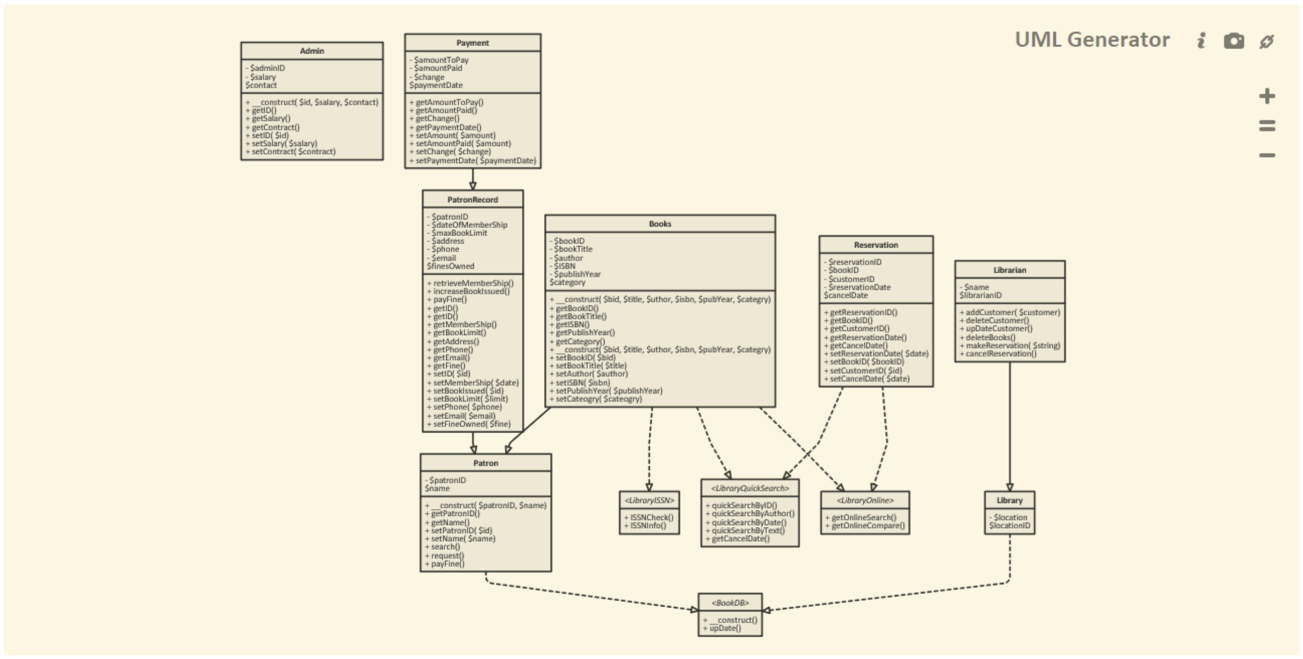


Figure 11shows the generated UML diagram

References

List of references:-

Book:

1. "Learning PHP, MySQL & JavaScript With jQuery, CSS & HTML5": Robin Nixon, O'Reilly Media, 2018.
2. "HTML5 Canvas Native Interactivity and Animation for the Web": Steve Fulton; Jeff Fulton, O'Reilly Media, 2013.

Code (Copy and Paste all of your project code…..)

ClassInformation class is to store the extracted information about classes from the source code

```
<?php
class ClassInformation
{
   private $properties;      // store properties of a class
   public function __construct( $name, $attributes = array(), $functions = array(),
$implements = array(), $extends = null )
   {
      $this->properties = array(
         'name'         =>  $name,
         'attributes'    =>  $attributes,
         'functions'     =>  $functions,
         'implements'    =>  $implements,
         'extends'       =>  $extends,
      );
   }
// getter
   public function __get( $key )
   {
      if ( !array_key_exists( $key, $this->properties ) )
      {
         throw new Exception("Sorry Doesn't exist");
      }
      return $this->properties[$key];
   }
  // setter
   public function __set( $key, $val )
   {
      if ( !array_key_exists( $key, $this->properties ) )
      {
         throw new Exception("Doesn't Exist");
```

```
        }
        $this->properties[$key] = $val;
    }
}
```

InterfaceInformation class is to store the extracted information about interfaces from the source code

```
<?php
class InterfaceInformation
{
    private $properties;          // to store the properties of an interface

    public function __construct( $name, $functions = array(), $extends = null )
    {
        $this->properties = array(
            'name'      =>  $name,
            'functions' =>  $functions,
            'extends'   =>  $extends,
        );
    }
// getter
    public function __get( $key )
    {
        if ( !array_key_exists( $key, $this->properties ) )
        {
            throw new Exception("Doesn't Exist");
        }
        return $this->properties[$key];
    }
// setter
    public function __set( $key, $val )
    {
        if ( !array_key_exists( $key, $this->properties ) )
        {
            throw new Exception("Doesn't Exist");
        }
        $this->properties[$key] = $val;
    }
}
```

FunctionInformation class is to store the extracted information about functions of a class or an interface from the source code

```
<?php

class FunctionInformation
{
    private $properties;   // To store the properties of a function

    public function __construct( $name, $modifier = 'public', $params = array() )
    {
        $this->properties = array(
            'name'      =>  $name,
            'modifier'  =>  $modifier,
            'params'    =>  $params,
        );
    }
// getter
    public function __get( $key )
    {
        if ( !array_key_exists( $key, $this->properties ) )
        {
            throw new Exception("Doesn't Exist");
        }
        return $this->properties[$key];
    }
// setter
```

```
    public function __set( $key, $val )
    {
        if ( !array_key_exists( $key, $this->properties ) )
        {
            throw new Exception("Doesn't Exist");
        }
        $this->properties[$key] = $val;
    }
}
```

Attribute class is to store the extracted information about attributes of a class or an interface from the source code

```
<?php
class Attribute
{
    private $properties;          // To store properties of an attribute

    public function __construct( $name, $modifier = 'public', $type = null )
    {
        $this->properties = array(
            'name'      =>  $name,
            'modifier'  =>  $modifier,
            'type'      =>  $type,
        );
    }
            // getter
    public function __get( $key )
    {
        if ( !array_key_exists( $key, $this->properties ) )
        {
            throw new Exception("Doesn't Exist");
        }
        return $this->properties[$key];
    }
// setter
    public function __set( $key, $val )
    {
        if ( !array_key_exists( $key, $this->properties ) )
        {
            throw new Exception("Doesn't Exist");
        }
        $this->properties[$key] = $val;
    }
}
```

FunctionParameter class is to store the extracted information about a function’s parameters information from the source code

```
<?php
class FunctionParameter
{
    private $properties;   // To store the parameters information of a function
    public function __construct( $name, $type = null )
    {
        $this->properties = array(
            'name'      =>  $name,
            'type'      =>  $type,
        );
    }
// getter
    public function __get( $key )
    {
        if ( !array_key_exists( $key, $this->properties ) )
        {
            throw new Exception("Doesn't Exist");
        }
        return $this->properties[$key];
    }
// setter
    public function __set( $key, $val )
    {
        if ( !array_key_exists( $key, $this->properties ) )
        {
            throw new Exception("Doesn't Exist");
        }
        $this->properties[$key] = $val;
    }
}
```

StructureTokenparserGenerator class is the most important class for syntax parsing of a PHP file. This class uses all the previous class to generate information about classes and interfaces from the uploaded PHP source code.

```
<?php
   require 'interface.php';
   require 'class.php';
   require 'function.php';
   require 'functionParameter.php';
   require 'attribute.php';

class StructureTokenparserGenerator
{

    private $classes;   // to store classes
    private $interfaces;  // to store interfaces
    private $parserStruct; // to store parser struct
    private $lastToken;    // to store the last token
    public function __construct()
    {
        // Initializing Global Attributes
        $this->initGlobalAttributes();
        // Initializing parser attributes
        $this->initParserAttributes();
```

```
}
// Initialization global attributes
private function initGlobalAttributes()
{
    // for storing classes
    $this->classes      = array();
    // For storing interfaces
    $this->interfaces   = array();
}
// Intializig parser attributes
private function initParserAttributes()
{
    // the intial parser attribute is empty evertything (class, interface, function)
    $this->parserStruct = array(
        'class'         => null,
        'interface'     => null,
        'function'      => null,
        'attributes'    => array(),
        'functions'     => array(),
        'typehint'      => null,
        'params'        => array(),
        'implements'    => array(),
        'extends'       => null,
        'modifier'      => 'public',
        'docblock'      => null,
    );
    // to store the last tokens
    $this->lastToken = array();
}
// to create the structure by given the array of files
public function createStructure( array $files )
{
    // everytime the global attributes is initialized
```

```
$this->initGlobalAttributes();
// loop through all files
foreach( $files as $file )
{
    // for every file, the intial parser attributes is renewed
    $this->initParserAttributes();
    $tokens = token_get_all( file_get_contents( $file ) );  // get the file in string format
    // Loop through all tokens
    foreach( $tokens as $token )
    {
        // Split into Simple and complex token
        if ( is_array( $token ) !== true )
        {
            switch( $token )
            {
                case ',':
                    $this->comma();
                break;
                case '(':
                    $this->opening_bracket();
                break;
                case ')':
                    $this->closing_bracket();
                break;

                case '=':
                    $this->equal_sign();
                break;
                default:
                    // Ignore everything else
                    $this->lastToken = null;
            }
        }
```

```
else if ( is_array( $token ) === true )
{
   switch ( $token[0] )
   {
      case T_WHITESPACE:
         $this->t_whitespace( $token );
      break;
      case T_FUNCTION:
         $this->t_function( $token );
      break;
      case T_VAR:
         $this->t_var( $token );
      break;
      case T_VARIABLE:
         $this->t_variable( $token );
      break;
      case T_ARRAY:
         $this->t_array( $token );
      break;
      case T_CONSTANT_ENCAPSED_STRING:
         $this->t_constant_encapsed_string( $token );
      break;
      case T_LNUMBER:
         $this->t_lnumber( $token );
      break;
      case T_DNUMBER:
         $this->t_dnumber( $token );
      break;
      case T_PAAMAYIM_NEKUDOTAYIM:
         $this->t_paamayim_neukudotayim( $token );
      break;
      case T_STRING:
         $this->t_string( $token );
```

```
            break;
            case T_INTERFACE:
               $this->t_interface( $token );
            break;
            case T_CLASS:
               $this->t_class( $token );
            break;
            case T_IMPLEMENTS:
               $this->t_implements( $token );
            break;

            case T_EXTENDS:
               $this->t_extends( $token );
            break;
            case T_PUBLIC:
               $this->t_public( $token );
            break;
            case T_PROTECTED:
               $this->t_protected( $token );
            break;
            case T_PRIVATE:
               $this->t_private( $token );
            break;
            case T_DOC_COMMENT:
               $this->t_doc_comment( $token );
            break;
            default:
               // Ignore everything else
               $this->lastToken = null;
               // And reset the docblock
               $this->parserStruct['docblock'] = null;
         }
      }
```

```
        }
        // One file is completely scanned here
        // Store interface or class in the parser arrays
        $this->storeClassOrInterface();
    }

    // Fix the class and interface connections
    $this->fixObjectConnections();
    // Return the class and interface structure
    return array_merge( $this->classes, $this->interfaces );
}
private function comma()
{
    // Reset typehints on each comma
    $this->parserStruct['typehint'] = null;
}
private function opening_bracket()
{
    // Ignore opening brackets
}
private function closing_bracket()
{
    switch ( $this->lastToken )
    {
        case T_FUNCTION:
            // The function declaration has been closed

            // Add the current function
            $this->parserStruct['functions'][] = array(
                $this->parserStruct['function'],
                $this->parserStruct['modifier'],
                $this->parserStruct['params'],
                $this->parserStruct['docblock']
            );
            // Reset the last token
            $this->lastToken = null;
            //Reset the modifier state
            $this->parserStruct['modifier'] = 'public';
            // Reset the params array
            $this->parserStruct['params'] = array();
            $this->parserStruct['typehint'] = null;
            // Reset the function name
            $this->parserStruct['function'] = null;
            // Reset the docblock
            $this->parserStruct['docblock'] = null;
        break;
        default:
            $this->lastToken = null;
    }
}
private function equal_sign()
{
    switch ( $this->lastToken )
    {
        case T_FUNCTION:
            // just ignore the equal sign
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_whitespace( $token )
{
    // Ignore whitespaces
}
private function t_function( $token )
```

```
{
   switch( $this->lastToken )
   {
      case null:
      case T_PUBLIC:
      case T_PROTECTED:
      case T_PRIVATE:
         $this->lastToken = $token[0];
      break;
      default:
         $this->lastToken = null;
   }
}
private function t_var( $token )
{
   switch ( $this->lastToken )
   {
      case T_FUNCTION:
         // just ignore the T_VAR
      break;
      default:
         $this->lastToken = null;
   }
}
private function t_variable( $token )
{
   switch( $this->lastToken )
   {
      case T_PUBLIC:
      case T_PROTECTED:
      case T_PRIVATE:
         // A new class attribute
         $this->parserStruct['attributes'][] = array(
             $token[1],
             $this->parserStruct['modifier'],
             $this->parserStruct['docblock'],
         );
         $this->lastToken = null;
         $this->parserStruct['modifier'] = 'public';
         $this->parserStruct['docblock'] = null;
      break;
      case T_FUNCTION:
         // A new function parameter
         $this->parserStruct['params'][] = array(
             $this->parserStruct['typehint'],
             $token[1]
         );
      break;
   }
}
private function t_array( $token )
{
   switch ( $this->lastToken )
   {
      case T_FUNCTION:
         // just ignore the T_ARRAY
      break;
      default:
         $this->lastToken = null;
   }
}
private function t_constant_encapsed_string( $token )
{
   switch ( $this->lastToken )
   {
      case T_FUNCTION:
            // just ignore the T_CONSTANT_ENCAPSED_STRING
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_lnumber( $token )
{
    switch ( $this->lastToken )
    {
        case T_FUNCTION:
            // just ignore the T_LNUMBER
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_dnumber( $token )
{
    switch ( $this->lastToken )
    {
        case T_FUNCTION:
            // just ignore the T_DNUMBER
        break;
        default:
            $this->lastToken = null;
    }
}

private function t_paamayim_neukudotayim( $token )
{
    switch ( $this->lastToken )
    {
        case T_FUNCTION:
            // just ignore the T_PAAMAYIM_NEKUDOTAYIM
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_string( $token )
{
    switch( $this->lastToken )
    {
        case T_IMPLEMENTS:
            // Add interface to implements array
            $this->parserStruct['implements'][] = $token[1];
            // We do not reset the last token here, because
            // there might be multiple interfaces
        break;
        case T_EXTENDS:
            // Set the superclass
            $this->parserStruct['extends'] = $token[1];
            // Reset the last token
            $this->lastToken = null;
        break;
        case T_FUNCTION:
            // Add the current function only if there is no function name already
            // Because if we know the function name already this is a type hint
            if ( $this->parserStruct['function'] === null )
            {
                // Function name
                $this->parserStruct['function'] = $token[1];
            }
            else
            {
                // Type hint
                $this->parserStruct['typehint'] = $token[1];
            }
        break;
        case T_CLASS:
            // Set the class name
            $this->parserStruct['class'] = $token[1];
            // Reset the last token
            $this->lastToken = null;
        break;
        case T_INTERFACE:
            // Set the interface name
            $this->parserStruct['interface'] = $token[1];
            // Reset the last Token
            $this->lastToken = null;
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_interface( $token )
{
    switch( $this->lastToken )
    {
        case null:
            // New initial interface token
            // Store the class or interface definition if there is any in the
            // parser arrays ( There might be more than one class/interface per
            // file )
            $this->storeClassOrInterface();

            // Remember the last token
            $this->lastToken = $token[0];
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_class( $token )
{
    switch( $this->lastToken )
    {
        case null:
            // New initial interface token
            // Store the class or interface definition if there is any in the
            // parser arrays ( There might be more than one class/interface per
            // file )
            $this->storeClassOrInterface();

            // Remember the last token
            $this->lastToken = $token[0];
        break;
        default:
            $this->lastToken = null;
    }
}

private function t_implements( $token )
{
    switch ( $this->lastToken )
    {
        case null:
            $this->lastToken = $token[0];
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_extends( $token )
{
    switch ( $this->lastToken )
    {
        case null:
            $this->lastToken = $token[0];
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_public( $token )
{
    switch ( $this->lastToken )
    {
        case null:
            $this->lastToken                = $token[0];
            $this->parserStruct['modifier']  = $token[1];
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_protected( $token )
{
    switch ( $this->lastToken )
    {
        case null:
            $this->lastToken                = $token[0];
            $this->parserStruct['modifier']  = $token[1];
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_private( $token )
{
    switch ( $this->lastToken )
    {
        case null:
            $this->lastToken                = $token[0];
            $this->parserStruct['modifier']  = $token[1];
        break;
        default:
            $this->lastToken = null;
    }
}
private function t_doc_comment( $token )
{
    switch ( $this->lastToken )
    {
        case null:
            $this->parserStruct['docblock'] = $token[1];
        break;
        default:
            $this->lastToken = null;
            $this->parserStruct['docblock'] = null;
    }
}
private function storeClassOrInterface()
{
    // First we need to check if we should store interface data found so far
    if ( $this->parserStruct['interface'] !== null )
    {
        // Init data storage
        $functions = array();

        // Create the data objects
        foreach( $this->parserStruct['functions'] as $function )
        {
            // Create the needed parameter objects
            $params = array();
            foreach( $function[2] as $param)
            {
                $params[] = new FunctionParameter( $param[1], $param[0] );
            }
            $functions[] = new FunctionInformation(
                $function[0],
                $function[1],
                $params
            );
        }
        $interface = new InterfaceInformation(
            $this->parserStruct['interface'],
            $functions,
            $this->parserStruct['extends']
        );
        // Store in the global interface array
        $this->interfaces[$this->parserStruct['interface']] = $interface;
    }
    // If there is no interface, we maybe need to store a class
    else if ( $this->parserStruct['class'] !== null )
    {
        // Init data storage
        $functions  = array();
        $attributes = array();
        // Create the data objects
```

```
foreach( $this->parserStruct['functions'] as $function )
{
    // Create the needed parameter objects
    $params = array();
    foreach( $function[2] as $param)
    {
        $params[] = new FunctionParameter( $param[1], $param[0] );
    }
    $functions[] = new FunctionInformation(
        $function[0],
        $function[1],
        $params
    );
}
foreach ( $this->parserStruct['attributes'] as $attribute )
{
    $type = null;
    // If there is a docblock try to isolate the attribute type
    if ( $attribute[2] !== null )
    {
        // Regular expression that extracts types in array annotations
        $regexp = '/^[\s*]*@var\s+array\(\s*(\w+\s*=>\s*)?(\w+)\s*\).*$/m';
        if ( preg_match( $regexp, $attribute[2], $matches ) )
        {
            $type = $matches[2];
        }
        else if ( $return = preg_match( '/^[\s*]*@var\s+(\S+).*$/m', $attribute[2],
$matches ) )
        {
            $type = trim( $matches[1] );
        }
    }
    $attributes[] = new Attribute(
            $attribute[0],
            $attribute[1],
            $type
          );
        }
        $class = new ClassInformation(
          $this->parserStruct['class'],
          $attributes,
          $functions,
          $this->parserStruct['implements'],
          $this->parserStruct['extends']
        );
        $this->classes[$this->parserStruct['class']] = $class;
      }
      $this->initParserAttributes();
    }

    private function fixObjectConnections()
    {
      foreach( $this->classes as $class )
      {
        $implements = array();
        foreach( $class->implements as $key => $impl )
        {
          $implements[$key] = array_key_exists( $impl, $this->interfaces )
                          ? $this->interfaces[$impl]
                          : $this->interfaces[$impl] = new InterfaceInformation( $impl );
        }
        $class->implements = $implements;

        if ( $class->extends === null )
        {
          continue;
```

```
         }
         $class->extends = array_key_exists( $class->extends, $this->classes )
                      ? $this->classes[$class->extends]
                      :   (   $this->classes[$class->extends]   =   new   ClassInformation(   $class-
>extends ) );
      }
      foreach( $this->interfaces as $interface )
      {
         if ( $interface->extends === null )
         {
            continue;
         }
         $interface->extends = array_key_exists( $interface->extends, $this->interfaces )
                        ? $this->interfaces[$interface->extends]
                        :  (  $this->interfaces[$interface->extends]  =  new  InterfaceInformation(
$interface->extends ) );
      }
   }
}

?>
```