

# Design and Implementation of a Career Guide Information System for Secondary School Leavers An Object Oriented Approach

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**Abstract:** *Career Guide Information System (CGIS) provides an automated online platform where students no matter their locations can get real online guide on their future careers and subjects choices and combinations that will help them realize their dreams. In developing this application a cutting-edge software development technology, the Object-Oriented design approach, is adopted which is an evolutionary and iterative process that encompasses abstractions of the system attributes and behaviours using necessary tools such as Unified Modeling language (UML) and implemented using PHP programming Language and MySQL, which offers lots of benefits that help the application to customize operations running on a server. The Career Guidance Information System enjoys additional benefit running on XAMPP technology which is robust and allows the application to use TCP/IP for intranet packet sharing and file/information transfers across system. The system provides an interactive friendly environment between online counselors and students. The students and Counselors are to be registered on the Career Guidance Information System (CGIS) by providing their bio-data and user names and passwords. The Counselors will in addition provide their areas of expertise. Once they are activated by admin, the student can login and choose his/her preferred Career Counselor and send his/her queries. The interaction between Counselors and Students can continue until issues are solved.*

**Keywords:** Career, Guidance and Counselling, Information Technology, System, Design and Implementation

## 1. Introduction

Providing or offering guidance to students on career choices have been of great concern to teachers, parents and even policy makers. Fitzjkenny (2013), stated that though there are many careers to choose from, individuals without guidance and counseling on future career choice decisions can be limited in their career options, especially if they are not prepared for the requirements of the workplace, underestimate their capabilities, or are unaware of the range of workplace opportunities that can broaden their career options.

This article discusses how such concerns can be addressed and designed and developed a Career Guide Student Information System (CGSIS), that will completely remove the problem of lack of speedy and ready access to information of subject combinations that can lead to various career choices, job opportunities for such careers and associated benefits.; making the students to be the architect of their careers.

**To achieve the above purpose, the study will:**

- 1) Design the system using the object oriented approach to system design, which has enormous benefits. It is an evolutionary and iterative process that encompasses abstractions of the system attributes and behaviours using necessary tools such as Unified Modeling language (UML).
- 2) The implementation of design will use XAMPP Technology which has PHP and MySQL as part of the system. PHP programming Language and MySQL, which offers lots of benefits that help the application to customize operations running on a server, PHP will

present the system in a real and fascinating manner for the students and more important it is robust for simple users. The numbers of systems connected can be many so there may be no need for the extra performance that Apache provides. The technology allows the application to use TCP/IP for intranet packet sharing and file / information transfers across the system. The versatility of MySQL and PHP also offers lots of benefits that can help the user of CAREER GUIDANCE to customize tasking operations running on the server. This offers a great benefit above the languages that ran only on the CGI core in the server side.

PHP as programming language is increasingly being used in server technology. It is also a programming language model that is organized by objects and actions, data and logic. PHP allows the usage of different software methodology since it allows Object-oriented programming. It can well identify objects sets of data and define their relationship to each other. These objects are then generalized into a grouping called class. Actions into methods or sequences of logic are applied to classes of objects. Methods provide computational instructions and class attributes are the data members that is acted upon by the object. Objects interact in the network using specifically defined interfaces called messages.

These messages are sent across the network sockets which are distributed. Packets are also sent across the network using different system devises. A PHP interpreter executes the program on the source server and sends the result which is usually data or simple XHTML or other mark-up codes. The behavior of this kind of system offers portability and reusability that characterizes PHP and its related technology.

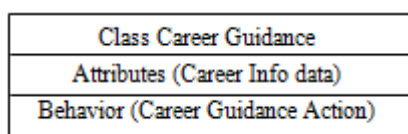
## 2. Systems Design

System design involves the evaluation of alternative development solutions and the specification of detailed computer – based solution. The key designs here are object-oriented design. Whereas the analysis focuses on the logical, implementation independent aspects of a system, design deals with the physical or implementation dependent aspect of the system. Since we are developing a career guidance system, it is appropriate to use a use case diagram in the design. In design of the system the analysis is used as a guide in developing the interface between the career guidance provider and the students and the system users. There interrelationships also depends largely on how issues affecting the guidance information are handled. In design, the object-oriented approach involves the classification of the entire system into classes that are capable of interacting with each other. These classes are then abstracted and designed in such a way as to build the system in a conceptual form. The structured approach in the other hand is a process-oriented technique for breaking up a larger program into a hierarchy of modules that result in a computer program that is implemented and maintained. The concept is simple. Design the program as a top-down hierarchy of modules. Module is a group of instructions a block, top-down hierarchy of modules. Modules is a group of instructive a block, subprogram, a procedure or function. The top-down structure of these modules is developed according to various design rules and guidelines. Structured design is considered a process technique because its emphasis is on the process building blocks in the career guidance system.

### 2.1 PHP Object Oriented System Design

The Object-oriented technique involves the entire system and addressed all the system concerns throughout the software engineering process. Those considering object-oriented technology must assess its impact on the entire software engineering process. Object-Oriented Design (OOD) involve the Domain design of the system use case using manual or Object –Oriented Computer Aided Software Engineering (OOCASE) tool.

The O-O design process is evolutionary and iterative. It encompasses abstraction of the system attributes and behaviors and using the necessary tools in building there design, UML are often used for OO design Process. Unlike the structured strategy OO paradigm considers both data and actions to be of equal importance. A simplistic way of looking at an object is as a unified software component that incorporates both the data and the actions that operate on that data.



**Figure 2.1:** A representation of Career Guidance in Object-Oriented Class

In figure 2.1 the element of object- oriented software development model shows a Career Guidance class model with attributes (data) and operations or behaviors (action). Hence data is encapsulated in the action of every class, object and message. Objects are identified in real life, classified and defined in terms of attributes and operations. Objects are identified in software from the problem statement (or by performing a “grammatical parse” on the narrative) in the system to be built. Objects are determined by underlining each noun or noun clause and entering it in a simple table. If the object is required to implement then it is part of the solution space. On the other hand if it necessary only to describe a solution it is part of the problem space. Objects can be:

- External entities (e.g., other systems, device, people) that produce a computer based system.
- Things (e.g., guidance\_reports, displays, letters, signals) that are part of the information based system.
- Occurrence or events (such as a admission or the completion of a series of exams or a click of mouse button) that occur within the content of system operations:
- Roles (e.g., Guidance and Councilor, manager, Instructor) played by people when they interact with the system.
- Organizational units (e.g., Schools, division, group, team) that are relevant to an application
- Places (e.g. School buildings, or lading dock) that establish the context of the problem and the overall function of the system; or
- Structures (e.g., sensors, or computers that define a class of object or in the extreme, related classes of object.

### I/O Design

The I/O design has to do with the Input –Output design of the system. It handles the design or plan on how data get into the career guidance information system and also how processed information get out of the system.

### Input Design

The inputs include the user name and password to login. But if the student is new there will be a need for supplying a Registration Information. This is used to identify the various entities. These details are keyed in by the admin via the use of the text entry keys. The information is processed; the computer generates summaries report and send to database for storage. The Registration information is of character type enabling a variance of maximum number of characters to be used considering the required information; the password is also a character type variable enabling the user to enter a maximum of eight(8) characters while the career guide user data is a set to operate together. The input is designed using Input controls such as **Textbox, Label, and List**.

- Textbox: - Allows text inputs. Uses the <input> attribute.
- Label: - Specifies the URL. Uses the <do> attribute.
- List: - Allows users to select among various alternatives. Uses the <select><option>attribute.

### Output Design

The interface is projected using the Hyper Text Transfer Protocol (HTTP). It contains the outcome of the input process. What the user will see on the screen. The output design is projected in form of interface, which are interactive

with the students. The relationship between user and Online Device is an interface.

**User Interface Design**

A user interface is a system that permits the interaction between human being and a computer. In order words, the interface design defines how users interact with the Career Guidance system and how the system captures information from the users. This project has a user interface design because of the level of interaction between the users and the Career Guidance Counselors' web information.

**Use Case Object-Oriented Models**

Use cases are object-oriented design scenarios for understanding system diagrams. A use case is an interaction between users and a system; it captures the goal of the users and the responsibility of the system to its users. The use-case model describes the uses of the system and shows the courses of events that can be performed. It is directed primarily towards the users or the "actors" of the systems, not its implementers.

**Use Case Description:**

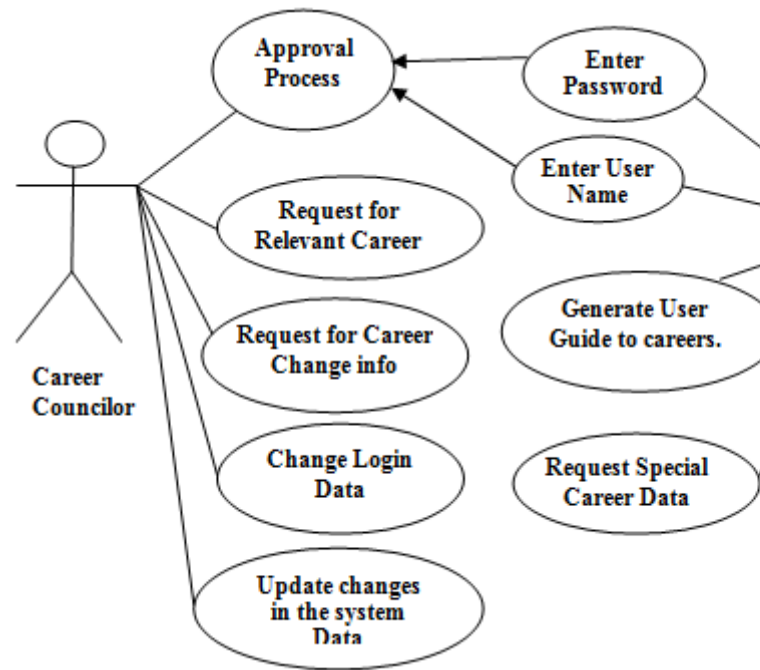
The purpose of the use case diagram is to portray:

- A set of use cases for a system.
- The actors (The initiators) which refers to the users and the Career Guidance.
- The relations between the actors and the use cases.

Here, we introduce five Use cases.

- Request for relevant Career
- Request for change of Career.
- Change of Login Data or Forgotten Password.
- Updates on changes in the system Data.
- Generate User Guide to Careers. The Career Guidance is responsible for the last two functions.

- Request Special Career Information



**Figure 3.2:** Use case diagram for a Career Guidance System

In figure 3.2 the use case diagram illustrate the interaction of the career guidance counselor with the system as well as the interaction of the users (students and school leavers) with the system. The users and Career counselor are the actors of the system and the system in turn responds to the actors by carrying out certain operations indicated in the use case design.

**Table 2.1:** Use Case Narrative of Career Guidance system

Use Case	E-Career Guidance		
Goal in content	Individuals can receive Career Guidance as both students and school leavers.		
Level	This is an E-Career Guidance use case		
Parameters	In: User Name and Password Out: Interface with welcome message and Career Guidance statement		
Preconditions	User is registered, user is a Student or school leaver (i.e. user name and password are valid)		
Post-conditions (success end)	Viewing of Career and decision derived makes the system successful.		
Post-conditions (failed end)	Viewing of Career and no decision derived makes system unsuccessful, and user need to retry		
Actor	Councilor, Student or School leaver		
Trigger	An individual's request to Career Guidance with E-Career Guidance.		
Description (event flow)	Actor action	System respond	Affected data object with operation
	1. Request to operate the E-Career Guidance platform by selecting the correct directive	2. Displays welcome and login page for user to enter his username and Password	Display Login
	3. Enter username and Password and press the Signin button	4. Verify username and Password	Read and verifies username and Password from data file
	5. If login is successful, view Career information.	6. Display E-Career Guidance options	Update Career data file with date and time.

The following scenarios show use-case interactions between the actor (students or school leavers) and the Career Guidance counselor:

**Career Guidance Operations:** The students interact with the Career Guidance system by requesting to be registered. After the approval process, the Career Guidance client can perform the operation.

**The Student (actor):** This is one of the bona fide users of the system who makes request for Career Guidance service.

**The Career Guidance Counselor (actor):** This is the guidance provider for the school leavers and the students.

**Request for Career information:** The existing students and school leavers of the Career Guidance requests for his/her

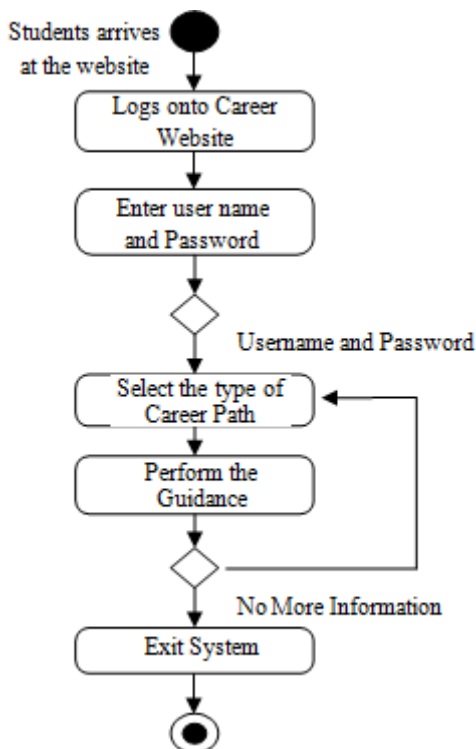
registration information based on the submission he has made. The Career Guidance checks the database to verify if the username and password are correct and assigns a permission to the user. If yes, the Career Guidance proceeds with the processing; if no, access is denied by the user.

The user must supply username whenever he/she opens the permitted application. Here are the steps in the Career Guidance operation use-case:

- After the students has been connected to the Career Guidance system. .
- Perform the Approval Process by entering username and password
- Request the career guidance information.
- Enter type of career.
- Career Guidance Performs activities.
- If there are no more transaction is to be performed, Career Guidance alerts students of necessary information.
- Exit Application.

### 2.2 System Activity Diagram

The purpose of an activity diagram is to provide a view of flows and what is going on inside a use case or among several classes. The activity diagram specified for the Career Guidance system shows some activities that can be performed by a Career Guidance client using an online device or the internet. The activity diagram is shown on the diagram below:



**Figure 2.3:** Activity Diagram for the career Guidance System

The activities involved in the diagram are explained as follows:

- At Start stage, the user logs on to the Career Guidance’s website

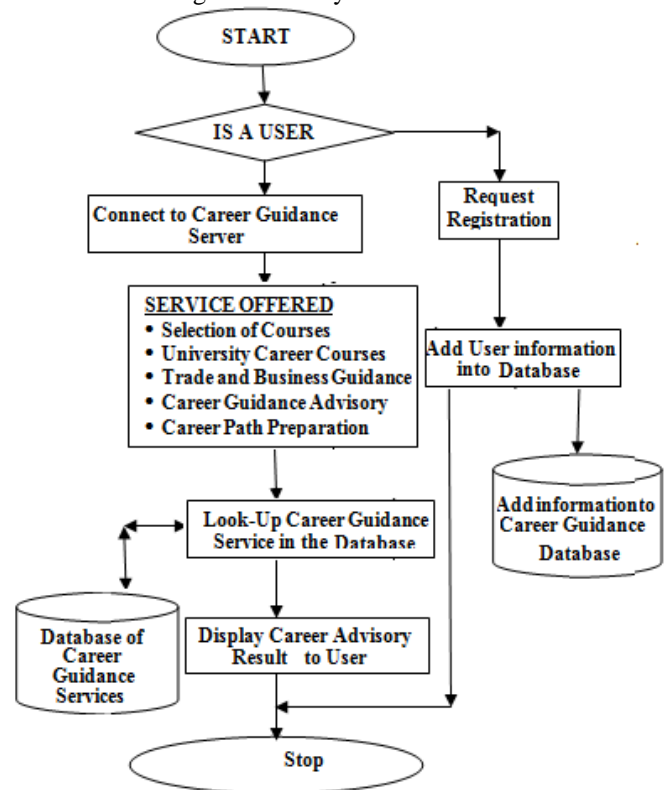
- On logging on, the user is prompted for the username and password
- If the username and password is valid, the user is prompted in and the Welcome screen is displayed listing the career guidance services available
- The user selects an area to get guidance
- If no more information are to be processed, the user exits the Career Guidance system, else he performs more tasks.

### 2.3 Processing Design

The first step is to open the Career Guidance, after which customers can begin to enjoy the Career Guidance services.

#### 2.3.1 Flowchart of the Career Guidance System

The flow chart below describes the flow of the system processes. It attempts to give a summary of the operations executed in the Career Guidance System. It displays the processes involved in the human-interface interaction of the Career Guidance application. The user begins by registering his user name and password, if he is already a user of the Career Guidance and has an existing and working account with the Career Guidance. The numerous Career Guidance services are then displayed for him to decide that which he wishes to do and then he carries out his operations duly. On the other hand, the user is not a registered customer of the Career Guidance and does not have any existing account, access would be denied until he has completed all necessary registration requirements. The diagram on the next page is the flowchart diagram of the system:



**Figure 2.4:** Program Flowchart for the Career Guidance System

#### 2.3.2 System Scenarios

A scenario can be seen as a simple story, a means of recording how things happen currently in the problem

domain, and of visualizing how users would like them to happen in the future system. In this project, we have identified six principal use cases: Log in, check career information, make career request, view Course direction statement and make special career information request. This section reveals how the use cases can be fleshed out by constructing scenarios;

### 2.3.3 Sequence

A sequence illustrates an interaction arranged in a time sequence. It shows the objects participating in the interaction by their lifelines (i.e. an object's existence during the interaction) and the messages they exchange, arranged in a time sequence.

### LOGIN

We are going to give a typical scenario for a Career Guidance user who attempts to log into the Career Guidance's website via the internet. The scenario represents the usual sequence of events specified for all other use cases in this project.

The sequence diagram is given below;

- User specifies the URL of the Career Guidance
- User is prompted for username
- User provides username
- User is prompted for password
- User provides password
- Career Guidance verifies username and password
- Login OK
- Website displays Welcome screen and lists of services available.

### Check Career

The use case checks career works on the premise that log in post condition is successful. The scenario and sequence diagram for the check career is given below:

- User logs in successfully into the Career Guidance system
- Online/Internet device displays Career services available
- Careers are displayed
- User exits the option

### Change of Career

The "Transfer of Career" scenario also, known as the "Career- Change" function works on the assumption that the student successfully logs into the Career Guidance System. The scenario describes the event that a student wishes to transfer from one career to another from his present career out-look to another and vice versa. The corresponding sequence is given below:

- User logs in successfully into the Career Guidance system
- Online/Internet device displays services available
- User selects the "Career" option
- User is prompted to key in the username of the sender
- User is prompted to key in the Career selected
- User clicks the submit button
- A result page showing a successful service delivery.

### Career Trade Option

This scenario explains the actions that take place when a user selects the Career of Trade option. Selecting this option enables a user to view in a tabular form all the Trade options available for him. The sequence describing this scenario is given below:

- User logs in successfully into the online/internet Career Guidance system
- Online device displays selection of Trade services
- A table showing all trade options including the details of the trade is displayed
- User exits the system or goes back to the option page

### 2.4 Database Design

A database management system (DBMS) is a set of programs that enables the creation and maintenance of a collection of related data. A DBMS and associated programs access, manipulate, protect, and manage the data. The fundamental purpose of a DBMS is to provide a reliable, persistent data storage facility and the mechanisms for efficient, convenient data access and retrieval. The database designed for the Career Guidance system is designed with the concept of creating a database for the user's, career information, and activity. Each table in the database consists of a primary key and foreign key which is used to link other related tables.

### Entity Relationship Diagram

We are going to use the ERD (Entity Relationship Diagram) as our database design tool. The ERD uses symbols to indicate entity sets, relationships and relationship types to produce an easily read, easily organized and easily expanded database blueprint.

This explains the relationships that exist between the entities in our E-Career Guidance system shown in the below;

- (1:N) => This means that one user can request for only one or many services.
- (1:N) => This means that a Career Guidance can register for one or more users.
- (1:1) => this means that a customer can enter in one user at a time.
- (1:1) => this means that a career is contained in a service.

### 2.5 Systems Architecture

From the server-side we have PHP which is a script, Apache server which serves as the web server to enable the interactions between users and My SQL which queries a database. These server-side applications respond to the request(s) made by the Clients (HTML script) via a special protocol known as HTTP (Hypertext Transfer Protocol). A diagram of the system architecture of the Career Guidance system and its server are shown below:

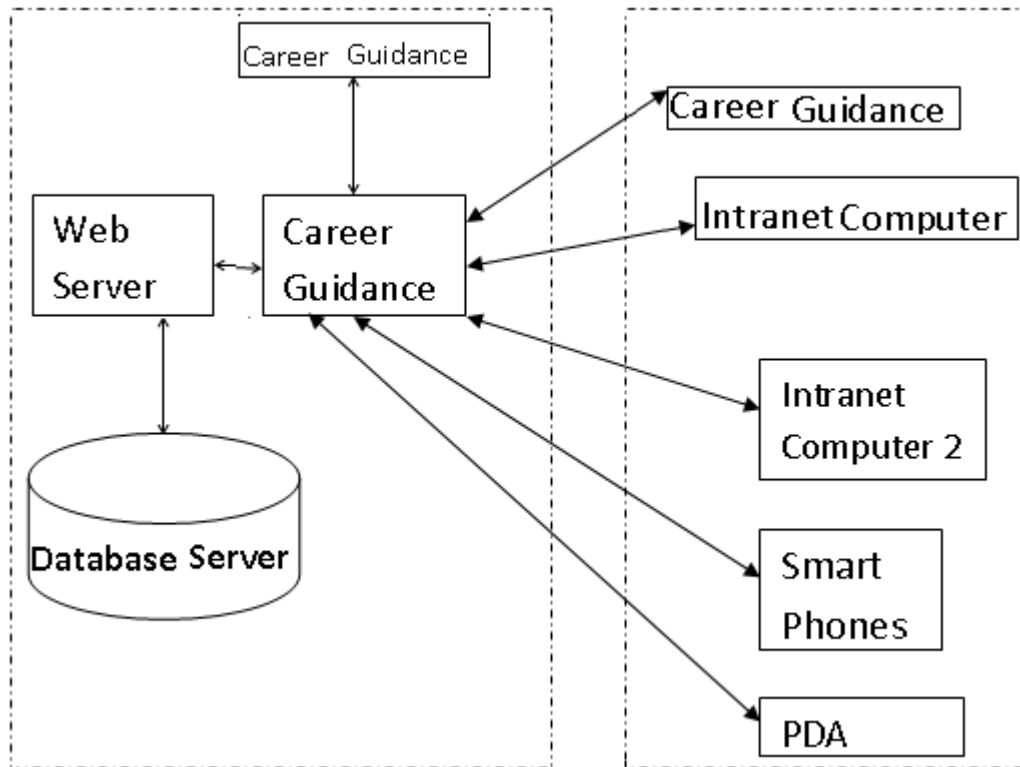


Figure 2.5 System Architecture of the Career Guidance Web Client and Server Design of Career System

In the design of the CAREER GUIDANCE SYSTEM , we use a LAN with an internet Protocol. It comprises of a switch that connects user 1, user 2 and user 3 and allows them to communicate. The wireless switch is an intelligent network device that segments networks. It makes efficient use of the network resources.

On receiving data packets, from the wireless router, it forwards it to the user 1, user 2 and user 3. This speeds up the network and reduces congestion. The switch plays active role in bringing down the overall network traffic. The wireless switch is connected to a wireless router. The wireless router maintains a routing table that contains information regarding the routing of data packets. The wireless router sends data packets from the server through the network to the users.

A server is a computer in the network that renders services to the users. It makes available to the user printer, disk drives. The wireless switch is hanged in a corner in a way to transmit the network signal within the area of coverage. When user enters the area he is connected. Similarly user 2 and user 3 are also connected when they come into area of coverage. Smart phones equally get connected on entering the area of coverage provided their connecting device allows them to connect.

All the connected devices are registered in the network and can easily communicate hence user 2 can easily send information to phone 1 or to user 1, 2 and 3. User 3 can also run application that is multiple users from the server as a client. User 1 can share files stored in the server with smart phones can also send information for printing in the printer. The server can also use the printer making the printer shared resources within the CAREER GUIDANCE system.

### 3. Architecture Within the CGS System

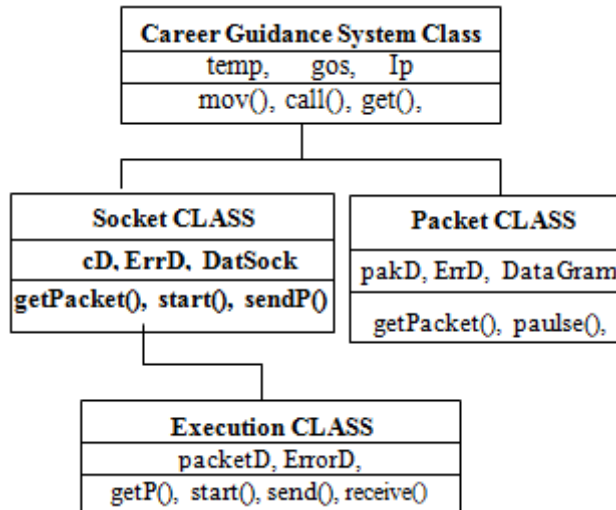
XAMPP is an acronym for Windows, Apache, MySQL, Perl and PHP technology. Windows is an operating system with many Versions including Windows 95, 98, XP, NT e.t.c. Internet Information Service is a web server that allows the user to do more than just send plain web pages when browsers request them. MySQL is a powerful relational database management system. It's a very good software package. MySQL database server provides the ultimate in scalability, sporting the capacity to handle deeply embedded applications with a footprint of only 1MB to running massive data warehouses holding terabytes of information. Platform flexibility is a stalwart feature of MySQL with all flavors of Linux, UNIX, and Windows being supported. And, of course, the open source nature of MySQL allows complete customization for those wanting to add unique requirements to the database server. MySQL is the de-facto standard for high-traffic web sites because of its high-performance query engine, tremendously fast data inserts capability, and strong support for specialized web functions like fast full text searches. These same strengths also apply to data warehousing environments where MySQL scales up into the terabyte range for either single servers or scale-out architectures. Other features like main memory tables, B-tree and hash indexes, and compressed archive tables that reduce storage requirements by up to eighty-percent make MySQL a strong standout for both web and business intelligence applications.

PHP is a server side scripting language for making logic driven websites. Ever wonder how they made that "contact us" form on their site, which sends out e-Career Guidance? Well, they used PHP. Or, how they made that image upload too? Well, they used PHP. PHP written scripts can use databases to keep track of the students and visitors activities

on your site, send out periodical advisory to general users or subscribers, upload files or images and drive the content on your site dynamically. The possibilities are endless. Most of the social networking websites you visit are written in PHP. Yep! PHP is that powerful.

### 3.1 Unified Modeling Language (UML) USE – Case

The unified modeling language (UML) has become the preferred graphical modeling language for designing object oriented system.



**Figure 3.1:** UML Showing Career Guidance Object interaction

Also, UML is a standard language for specifying visualizing, constructing and documenting the artifacts of software systems as well as for business modeling and other non-software systems. The UML represents the collection of best engineering practices that proven success in the modeling of large and complex systems.

### 4. Conclusion

In paper, we have discussed the challenges associated with manual career guidance system and have developed a software application career guide information system for students both in junior and senior secondary school as well as for school leavers. This will remove the problem of lack of speedy and ready access to information of subject combinations that can lead to various career choices, job opportunities for such careers and associated benefits.; making the students to be the architect of their careers with aid from the career guides as torch bearers.

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