

# PHP Web Authoring for Database Management based on MVC Pattern

Chanchai Supaartagorn

**Abstract**—Nowadays, the MVC pattern is the effective method for the development of modular applications. The MVC design pattern breaks the application into three modules: model, view, and controller. However, developers must have programming skills for creating each module. In addition, they must have the knowledge about Structured Query Language (SQL) for database management. The PHP web authoring (PHP-WA) proposes to remedy these problems. The PHP framework was designed and embedded in the PHP-WA to handle the database. We're prepared tools that automatically generate the program code for the view module and controller module.

**Index Terms**—MVC, SQL, PHP Web Authoring (PHP-WA)

## I. INTRODUCTION

PHP is a server-side scripting language for developing dynamic web applications. One of the defining features of PHP is the ease for developers to access a database. There are several ways to connect to a database, for example, PHP extensions, Active Data Objects DataBase (ADODB), PHP Data Objects (PDO), etc. However, one of the difficult issues in database manipulation is coding the Structured Query Language (SQL). Indeed, several studies suggest that traditional database query language is not very simple to use, for non skilled users of database technologies, as a consequence of the fact that interaction is based on a textual language such as SQL [1].

One way to solve the problem is to develop a web application framework that provides libraries for database manipulation. A web application framework usually implements the Model View Controller (MVC) pattern. The MVC pattern breaks an application into three associated modules: model, view, and controller. The model module is the business logic of the application and is the core of the application [2]. The View is the user interface of the controller. It is the public face of the user event's response [3]. The Controller component implements the flow of control between the view and the model [4]. The MVC pattern is interesting to research because its simplicity makes it more acceptable to developers. Unfortunately, developers must have programming skills. They will have to design and create a model module that contains the underlying classes whose instances are to be used for manipulating the database. In addition, they must create a controller module

to handle the user events and create a view module to render the appearance of the data in the user interface.

This research proposes a tool for a web application which enables interface developers to cheaply develop. The tool, called PHP Web Authoring (PHP-WA), which is software to produce web contents, [5] is accessible to any user with a web browser. The PHP-WA was implemented with PHP, JQuery and AJAX technologies. In addition, its implementation was based on the MVC pattern. We use the PHP framework from the our previous research [6]. The PHP framework for the model module is embedded in the PHP-WA. In addition, we're prepared the tools that automatically generate the program code for the view module and controller module.

The rest of this paper is organized as follows: Section II describes the related works. Section III discusses the architecture of the system. Section IV presents a detailed description of the PHP-WA. Section V shows a web application example. Section VI draws the conclusions and proposals for future research.

## II. RELATED WORKS

More recently, efforts have been undertaken to develop the framework for web application. Wang Ning, Li Liming, Wang Yanzhang, Wang Yi-bing and Wang Jing [7] developed a web information system platform based on the MVC pattern. The platform is divided into three layers: model layer, control layer, and view layer. The Model layer consists of Control Model of system, for supporting the control mechanism of the whole framework, and Control Model of Operation Logic, for combining functions of the system. The Control Layer indexes the "Model Register" after receiving a user's request, and transfers Operation Logic to dispose operation workflow. The view layer gets the data from model, and is updated by controller. Wei Cui, Lin Huang, LiJing Liang and Jing Li [8] developed a PHP framework based on the MVC pattern. The model encapsulated common database operations such as SELECT, INSERT, UPDATE, DELETE, and so on, which made a further simplification of database operations. The controller is divided into two parts: front controller and action controller. The front-end controller is mainly responsible for analysis of user's requests and forwards the user requests to the appropriate controller action processing. The action controller is mainly to answer calls for the feat model generation, for the view of the use of data. The view uses the Smarty Templates technology. Programmers merely have to extract, organize and disposal the data needed, and then, through the smarty template, handle the interface. In these frameworks, developers must create a view and controller

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that work in association with the model. This feature is only suitable for intermediate programmers or expert programmers. We solve the problem by creating web authoring, which automatically generates the program code for the view and controller.

There is some research work that applies the MVC pattern for developing various web application systems. Caixian Chen and huijian Han [9] designed and developed distance education systems by using the MVC pattern. The designing, for model classes was developed with JavaBean. There are three kinds of classes: business object classes, application classes and testing class. The business object classes support a table in backstage database. The application classes are used to delegate all entities the system knows. For example, connect/disconnect the database, add/update/delete examination question, etc. The Testing class is a tool class to test the Model class. The controller component is there to operate the model and change its states, in line with a user's input. The system uses ControllerServlet, a single Servlet, to act as the controller and shift the control right. The designing of view was developed with JSP (Java Server Page). The view creates the dynamic pages that return to the users based on the result of business processing. Yanfang Wang, Chunyan Guo and Lei Song [10] designed and developed E-Commerce systems by using the MVC pattern. The model or business logic was developed with JSP (Java Server Page). It includes user authentication, online product catalogs, shopping cart, special functions, order generating, checkout features and E-mail confirmation. The JSP documents are the view and Servlet serves as the controller. The servlet receives all HTTP requests, and calls the appropriate business logic model, then runs different JSP documents according to the processing results. End clients can receive the HTML response in a browser. Tao Peng and Hong Bao [11] designed and developed an ATM Simulation system by using the MVC pattern. The system was designed and implemented with Microsoft Visual C++ 6.0 and Microsoft SQL Server 2000. In the model part, there are two classes: Card class and Rules class. The Card class stands for the bank card. The Rules class includes some business rules in the bank's domain, for example, cash withdrawal ceiling amount in one day, withdrawal ceiling amount of one transaction, cross-bank ATM fee, cross-bank inquiry fee, off-site ATM fee, and so on. In the view part, the class View was designated. The command-line mode user interface, instead of GUI mode, was used for simplicity. In the controller part, it was fulfilled by the class Card and class DBAccess for access data in the database. In these web application examples, the model part was designed and developed as the framework for specific systems, for example, the framework for distance education, E-Commerce, banking system, etc. Therefore, it cannot provide a framework for the system in other designs. We solve the problem by creating web authoring, which embeds the PHP framework for database management. The common operations of framework are INSERT, DELETE, UPDATE and SELECT.

### III. ARCHITECTURE OF THE SYSTEM

In this section, we focus on the architecture of the PHP-WA. Its purpose is to help users to develop web applications

with minimum effort. The architecture of the system is shown in Fig. 1.

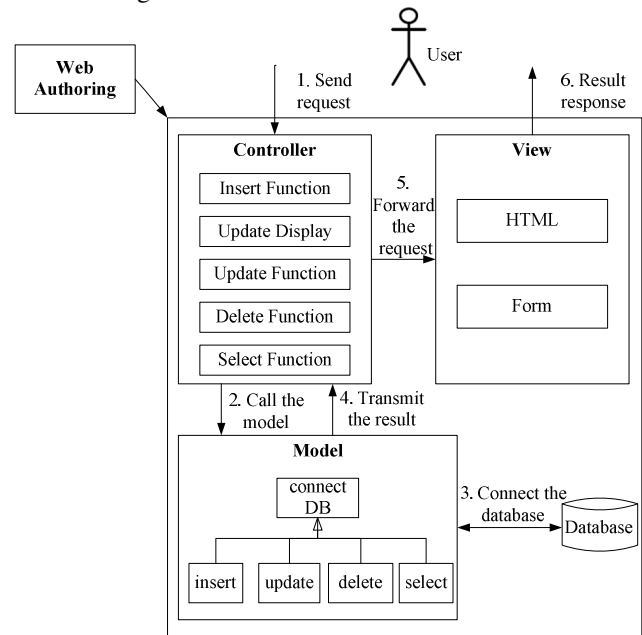


Fig. 1. Overall system Architecture of the PHP-WA

The web authoring is a layer above the PHP framework for database management based on the MVC pattern. The MVC pattern breaks an application into three modules: model, view, and controller. Firstly, the model contains the underlying classes created from the our previous research. There are five classes in the model module: connectDB class, insert class, update class, delete class, and select class. The connectDB class is used to connect the hosting and select the database. The insert class is used to operate the inserting record inside table. The update class is used to show the record that matches with the condition specified. In addition, it operates the updating record inside table. The delete class is used to operate the deleting record inside table. The select class is used to operate select statement and compute aggregate function in single table and multiple tables. The class diagram of the model is shown in Fig. 2.

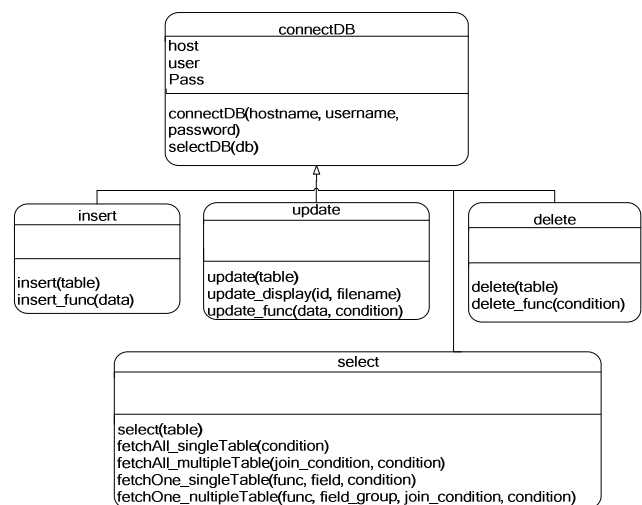


Fig. 2. Class diagram showing the model module [6]

Secondly, the view is the user interface of the controller. We're prepared the tools for creating the basic HTML tag and form tag, for example: text format, text justify, order

list, unordered list, image, link, table, heading, form, text field, hidden field, text area, checkbox, radio box, list box, and button. Finally, the controller contains code to handle the user actions and invoke changes in the model. We're prepared the tools that automatically generate the program code for the controller. There are four parts in the controller module: Insert function, update display and update function, delete function, and select function. Firstly, the Insert function is used to create the controller code for inserting records. The sequence of Insert function is as follows: connect the database -> select the database and the table -> set array of inserting field -> call the insert\_func() method inside the insert class. Secondly, the updating process is divided into two steps. The first step is the Update display that is used to create the controller code for showing the updating record. The sequence of Update display is as follows: connect the database -> select the database and the table -> set filename for Update function -> call the update\_display() method inside the update class. The second step is the Update function that is used to create the controller code for updating records. The sequence of Update function are as follows: connect the database -> select the database and the table -> set fieldname for updating condition -> call the update\_func() method inside the update class. Thirdly, the Delete function is used to create the controller code for deleting record. The sequence of Delete function is as follows: connect the database -> select the database and the table -> set fieldname for deleting condition -> call the delete\_func() method inside the delete class. Finally, the Select function is used to create the controller code for selecting records. The sequence of Select function is as follows: connect the database -> select the database -> select the table -> set fieldname to join the table -> call the select method inside the select class. The fetchAll\_singleTable() method and fetchAll\_multipleTable() method return all fields for the supplied select statement in single table and multiple tables respectively. The fetchOne\_singleTable() method and fetchOne\_multipleTable() method is used to compute aggregating function in single table and multiple table respectively. All structures of the controller module are shown in Fig. 3 (a) and Fig. 3 (b).

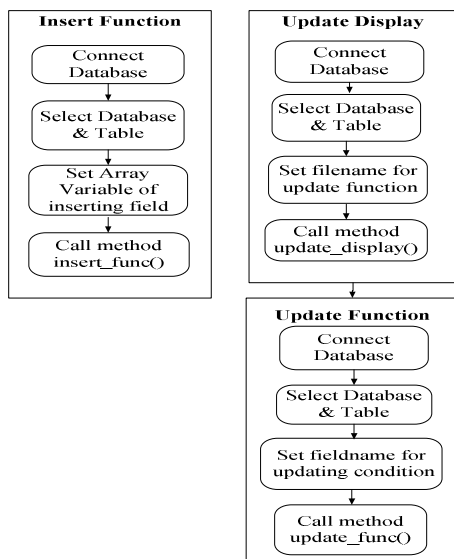


Fig. 3 (a). Insert function and Update function of the controller module

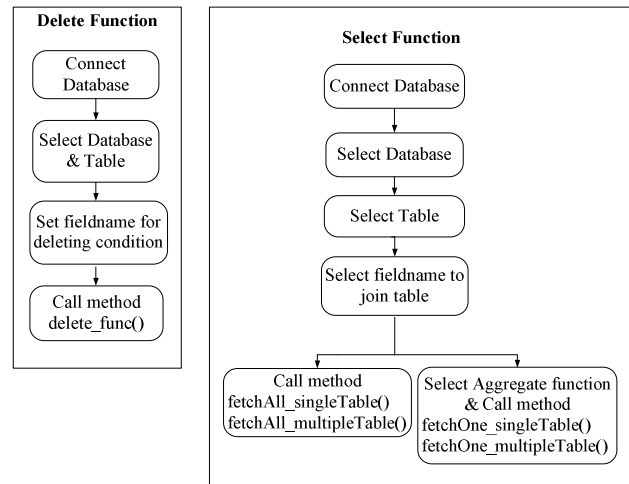


Fig. 3 (b). Delete function and Select function of the controller module

#### IV. PHP-WA IMPLEMENTATION

In order to use the PHP-WA in an easy way, in our proposed system, major concern must be given to the layout of the user interface. When a user runs the PHP-WA through a web browser, the system prepares the tools for the view module and controller module and then loads the layout of the user interface as shown in Fig. 4.

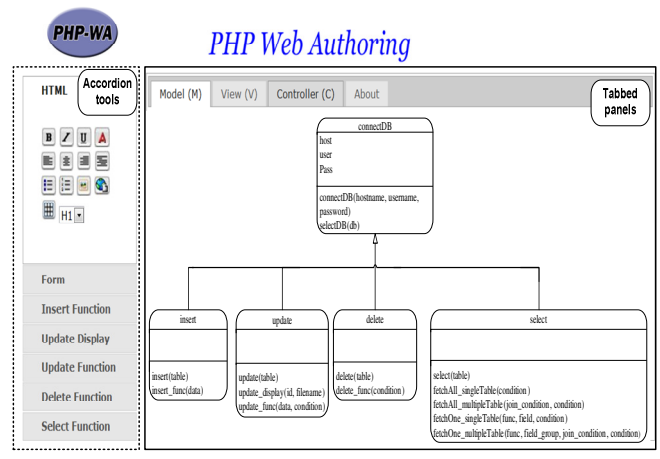


Fig. 4. The layout of user interface

The interface has two main components: the accordion of tools (left) and the tabbed panels of MVC (middle).

There are seven groups of the accordion tools: HTML tool, Form tool, Insert function tool, Update Display tool, Update function tool, Delete function tool and Select function tool. The HTML tool and Form tool are the tools for creating the code of the view module. The rest are tools for creating the code of the controller module. The interface example of the Insert function tool is shown in Fig. 5.

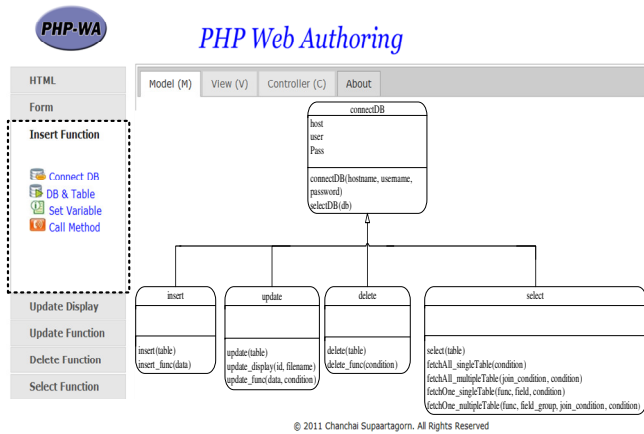


Fig. 5. The accordion of the Insert function tool

There are four parts of the tabbed panels: Model (M), View (V), Controller (C), and About. The Model (M) presents the class diagram of the model module, which shows the details of any classes with tooltip. The View (V) and Controller (C) are the code editors of the view module and controller module respectively. The user can open, save, and close files within this part. Finally, the About presents the details of the PHP-WA. The interface of View (V) is shown in Fig. 6.

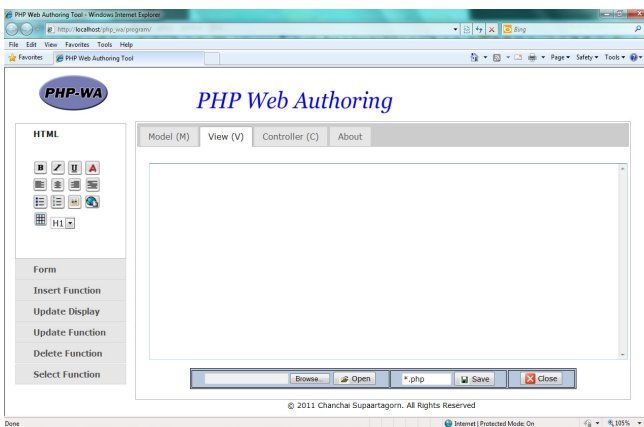


Fig. 6. The tabbed panel of View (V)

## V. EXAMPLE WEB APPLICATION

In this section, we show an example of a web application that was created from the PHP-WA. The database example relates to employee data. The details of the employee table and department table are shown in TABLE I and TABLE II.

TABLE I  
 The details of employee table

employeeID	name	job	salary	departmentID
1111	Somchai	Programmer	15000	128
2222	Wichit	DBA	13500	42
3333	Somjai	Programmer	16500	128
4444	Aphisit	System Administrator	12000	130
4445	Younyut	Programmer	20000	128
4446	Somjit	Programmer	16500	128

TABLE II  
 The details of department table

departmentID	name
42	Finance
128	Research and Development
130	Marketing

We will show the SELECT web application that joins between employee table and department table. We start by creating the view module that uses the table tag from the HTML tool, to design the presentation of an employee report. The view code is shown in Fig. 7.

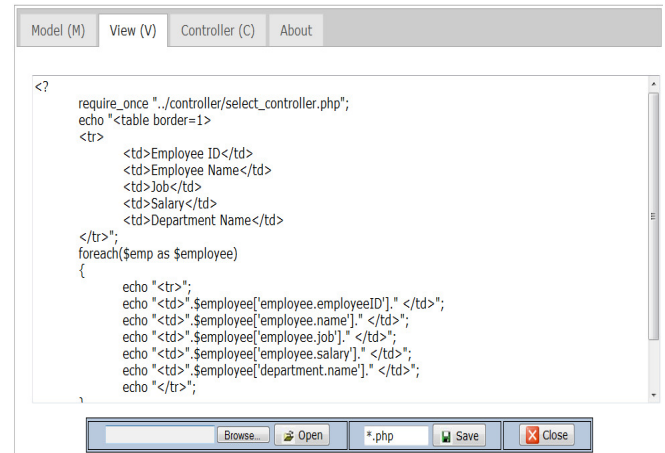


Fig. 7. The view code of the employee report

Then we create the controller code. There are six steps of the Select function. In the first step, we click on the Connect DB button in the Select function tool. The connect database popup will be displayed. We enter the host name, user name, and password to connect the database. This will generate the code in the controller editor. The process of the first step is shown in Fig. 8 (a) and Fig. 8 (b).

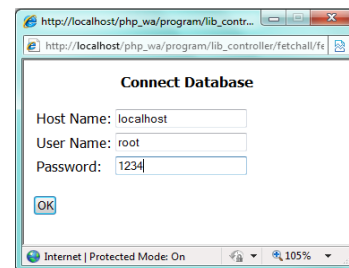


Fig. 8 (a). The connect Database popup

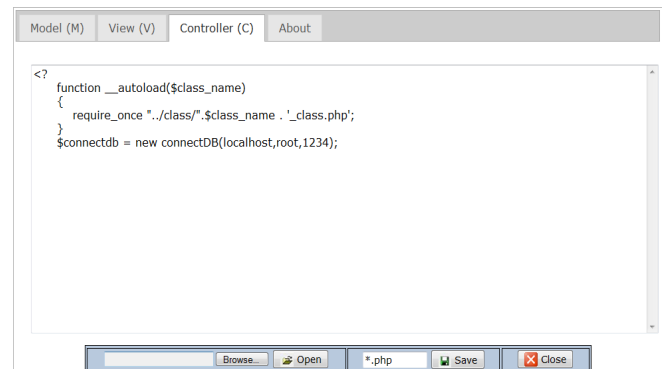


Fig. 8 (b). The controller code of connect database

In the second step, we click on the Select DB button in the Select function tool. The select database popup will be displayed. We choose the database name. This will generate the code in the controller editor. The process of the second step is shown in Fig. 9 (a) and Fig. 9 (b).

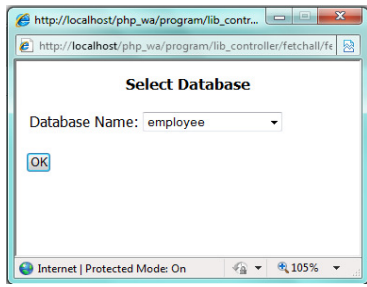


Fig. 9 (a). The Select Database popup

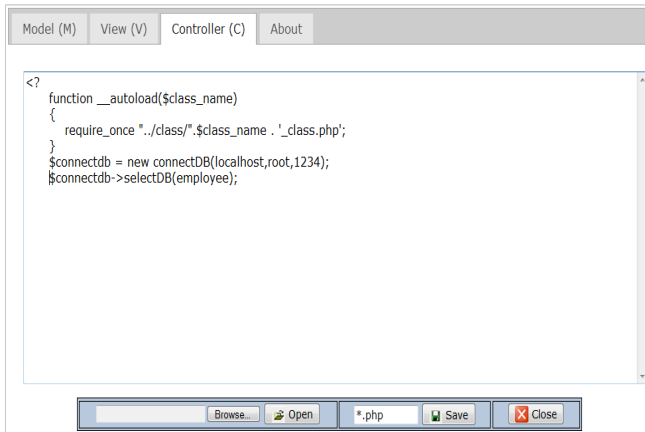


Fig. 9 (b). The controller code of selecting database

In the third step, we click on the Select Table button in the Select function tool. The select table popup will be displayed. We choose the number of table to join and then choose the table name. This will generate the code in the controller editor. The process of the third step is shown in Fig. 10 (a) and Fig. 10 (b).

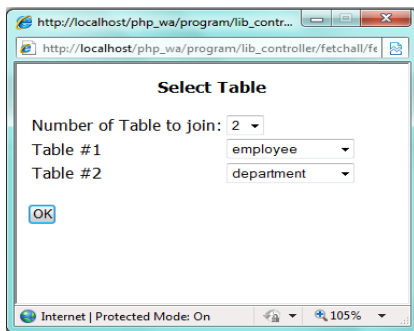


Fig. 10 (a). The Select Table popup

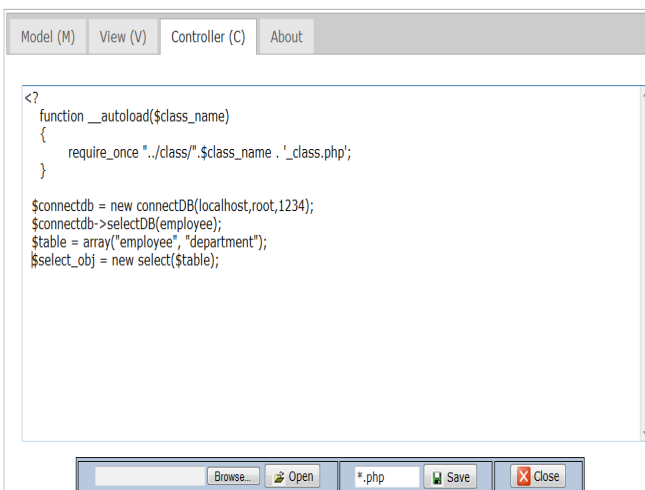


Fig. 10 (b). The controller code of selecting table

In the fourth step, we click on the Set Condition button in the Select function tool. The set condition popup will be displayed. We choose the field for joining the table and then enter the condition to select the record. This will generate the code in the controller editor. The process of the fourth step is shown in Fig. 11 (a) and Fig. 11 (b).

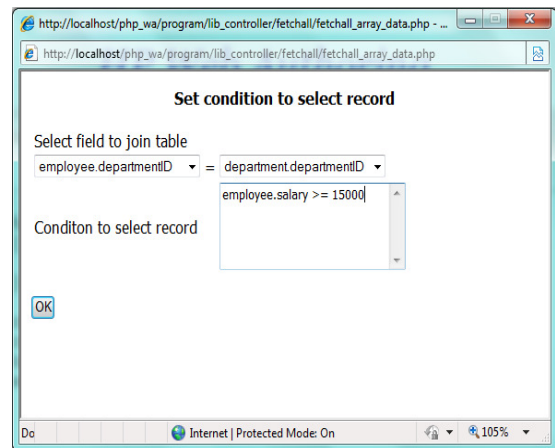


Fig. 11 (a). The set condition popup

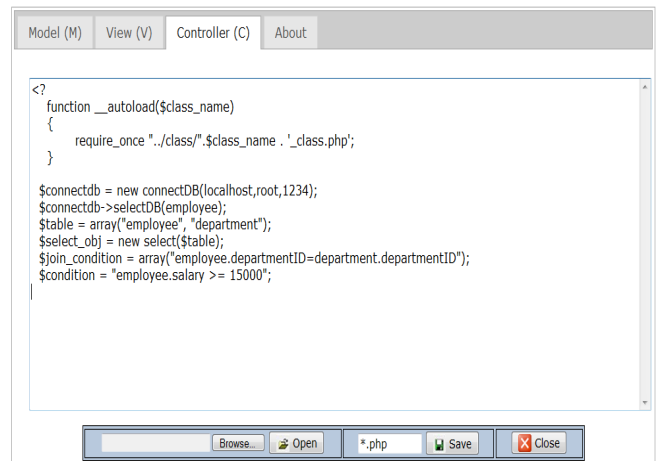


Fig. 11 (b). The controller code of setting condition

In the fifth step, we click on the fetchAll button in the Select function tool. The call method popup will be displayed and then we click on the OK button. In this example, it will call the fetchAll\_multipleTable() method. This will generate the code in the controller editor. The process of the fifth step is shown in Fig. 12.

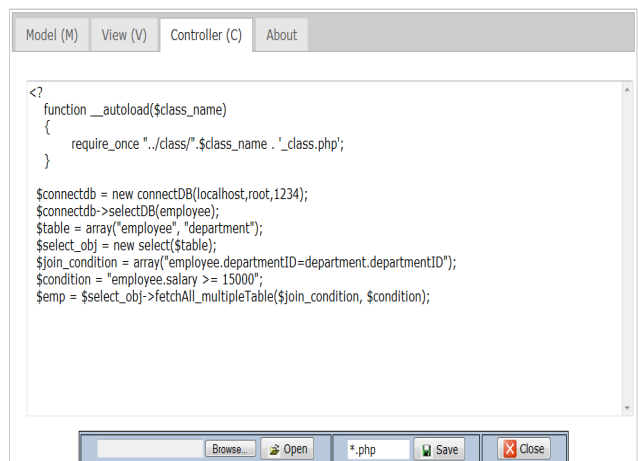


Fig. 12. The controller code of calling the fetchAll method



In the last step, we click on the fetchOne button in the Select function tool. The call method popup will be displayed. We choose the aggregate function and field to compute. In this example, it will call the fetchOne\_multipleTable() method. This will generate the code in the controller editor. The process of the last step is shown in Fig. 13 (a) and Fig. 13 (b).

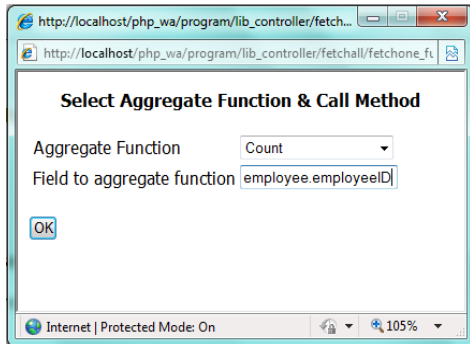


Fig. 13 (a). The Select Aggregate Function popup

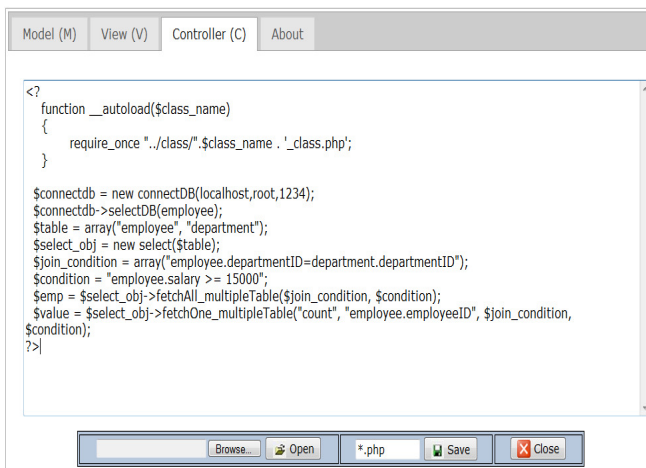


Fig. 13 (b). The controller code of calling the fetchOne method

After that, we save the view code and controller code. The employee report of salary that is greater than, or equal to 15000 through a web browser is shown in Fig. 14.

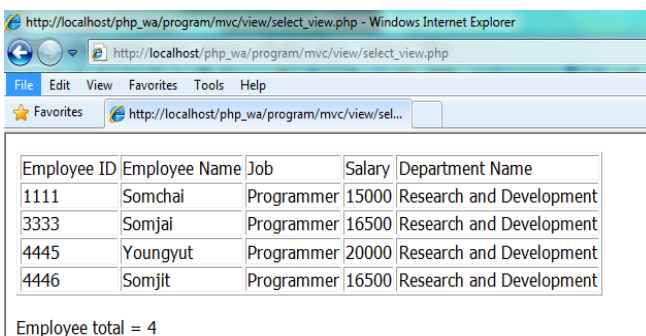


Fig. 14. Employee report of salary that is greater than, or equal to 15000

## VI. CONCLUSION AND FUTURE RESEARCH

In this research we presented the PHP web authoring for database management based on the MVC pattern. The tool is called PHP Web Authoring (PHP-WA). We embed the PHP framework, which contains the underlying classes for database management, in the model module. Furthermore,

we're prepared the tools that automatically generate the program code for the view module and controller module. The PHP-WA can save time, cost, and other resources in developing a web application.

In addition, we describe the related works, which lead to the concept of system development. The architecture and implementation is also present in order to understand the features of the system. Lastly, we show an example of a web application that was created from the PHP-WA.

In future research, we will include refinement and enrichment of the model, view, and controller. In addition, we will improve the design of the PHP-WA in order to make it more user friendly and develop the web application system of the PHP-WA, for example, an online shopping system, an inventory system, and a marketing system, etc.

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