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# **Generating Images using PHP**

(Project of an application)

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## DESCRIPTION

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<b>Name of the bachelor's thesis</b> Generating images using PHP			
<b>Abstract</b>  <p>In contemporary society, PHP is one of the most popular general-purpose programming languages and widely used by programmer in our daily life. PHP contains an important database called GD library. GD library generates many kinds of images like charts, graphics, thumbnails and most anything else.</p> <p>Programmer usually uses the software of Apache, MySQL in combination with PHP language to build the programming environment. So the connection between Apache, MySQL and PHP language is very important. After the connection is built, the data in the later programme can be saved in MySQL.</p> <p>In this thesis, I built a basketball MVP voting system. At first, I provided a voting page. After voting for one of the player, the result is shown by every basketball player's voting number, the percentage and the change of length of the bar chart.</p>			
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## LIST OF FIGURES

Figure 2.1 The LOGO of PHP Language.....	3
Figure 3.1 The LOGO of Apache HTTP Server.....	15
Figure 4.1 The LOGO of MySQL.....	19
Figure 5.1 Successful install Apache.....	26
Figure 5.2 Log in MySQL.....	26
Figure 5.3 Connection with PHP and Apache.....	28
Figure 5.4 Connection with MySQL and PHP.....	29
Figure 5.5 Information of Candidates 1 .....	31
Figure 5.6 Information of Candidates 2 .....	32
Figure 5.7 The Page of MVP 09—10.....	33
Figure 5.8 The Page of show_MVP.....	33
Figure 5.9 Before vote.....	37
Figure 5.10 Voting.....	38
Figure 5.11 After voting .....	39

## CONTENTS

1 INTRODUCTION.....	1
2 PHP LANGUAGE .....	3
2.1 The Overview of PHP Language.....	3
2.2 The History and Different Versions of PHP .....	3
2.2.1 History of PHP .....	3
2.2.2 The Development of PHP and Characters.....	4
2.3 The Functions of PHP .....	6
2.4 The Features of PHP .....	6
2.5 Different Versions of PHP .....	7
2.5.1 PHP 3.....	7
2.5.2 PHP4.....	7
2.5.3 PHP 5.....	9
2.5.3.1 New Object Mode .....	9
2.5.3.2 Custom Error Handling .....	12
2.5.3.3 Namespace .....	12
2.5.3.4 GD library .....	13
3 APACHE SERVER .....	14
3.1 The Overview of Apache Server .....	14
3.2 The Features of Apache Server .....	15
3.3 Famous Projects of Apache .....	16
4 MYSQL.....	19
4.1 The Overview of MySQL.....	19
4.2 Features and Benefits of MySQL.....	20
4.3 Some Basic Commands of MySQL .....	21
4.4 Precautions When Installing MySQL.....	23
5 PRATICE PART .....	25
5.1 Install the Programming Environment .....	25
5.1.1 Installation of Apache.....	25
5.1.2 Installation of MySQL .....	26

5.1.3 Installation of PHP .....	26
5.1.4 Setting up Connection .....	27
5.2 Setting up MySQL Database .....	30
5.3 Creating the Page of NBA MVP 09——10 .....	32
5.4.1 Creating the Page of Show MVP .....	33
5.4.2 Updates The Vote Databases and retrieves the New Results .....	34
5.4.3 Sets up all the Variables.....	34
5.4.4 Sets up all the Graph .....	36
5.4.5 Draws the actual Data onto the Graph .....	36
5.5 The Change of Images.....	37
6. CONCLUSION .....	40
REFERENCES.....	41

## 1 INTRODUCTION

PHP is one of the most popular general-purpose programming languages in the contemporary society. The reason for this is PHP's powerful ability and availability for different kinds of databases. One of the most important databases which generate many kinds of images like charts, graphics, thumbnails and most anything else is GD2 library. In this thesis, I will build an MVP results chart from MySQL database table information which uses PHP language.

The aim of the study is to learn basic techniques how to generate images using GD2 library.

The practical aim of this thesis is to build an MVP voting system. After you vote for your favorite basketball player, then you can check the overall voting results, which will be represented by bar chart with different proportion and clear numbers.

The structure of the study is as follows.

In Chapter 2 I will introduce the PHP language, which contains its history, features, different versions of PHP, and GD library.

In Chapter 3 I will explain Apache software, which includes its functions, and some Apache's famous project.

In Chapter 4 I will introduce the software of MySQL, which consists of its features, some basic commands, and so on.

In Chapter 5 I will illustrate the specific steps one by one. This includes building the connection between MySQL and Apache, how to build database in MySQL, how to generate bar chart and text in different color using PHP.

In Chapter 6 I will conclude the thesis. I will explain some problems which I met and how I solved them.

## **2 PHP LANGUAGE**

### **2.1 The Overview of PHP Language**

PHP language is abbreviated for Hypertext Preprocessor. PHP is one of the general-purpose programming languages which were mainly used for web development to produce dynamic web pages, and a server-side implementation of the HTML document embedded scripting language. The language style is similar to the C language. In contemporary society, PHP is one of the most popular general-purpose programming languages and widely used by programmers in our daily life. [1]

PHP is fit for almost all of the operating systems, like Linux, Windows XP and Windows 7 and completely free of charge. The following Figure 2.1 shows the ICO of PHP language.



Figure 2.1 The LOGO of PHP Language

### **2.2 The History and Different Versions of PHP**

#### **2.2.1 History of PHP**

PHP originally stood for personal home page. It began in 1994 as a set of Common



Gateway Interface (CGI) binaries written in the C programming language by the Danish/Greenlandic programmer Rasmus Lerdorf. Lerdorf initially created these Personal Home Page Tools to replace a small set of Perl scripts he had been using to maintain his personal homepage. The tools were used to perform tasks such as displaying his résumé and recording how much traffic his page was receiving.

Lerdorf released PHP 2 on June 8, 1995. It contains Perl-like variables, form handling, and the ability to embed HTML. Compared with Perl, the syntax is more or less similar but more limited, simpler, and less consistent.

Zeev Suraski and Andi Gutmans published PHP 3 in June 1998 and they produced the Zend Engine in 1999.

PHP 4 was released in May, 2000 and it is powered by the Zend Engine 1.0.

PHP 5 was released on July 13, 2004. Compared with other versions of PHP, PHP 5 contains some new functions such as improved support for object-oriented programming, the PHP Data Objects extension, and numerous performance enhancements. The latest PHP version is PHP 5.3. [2]

### **2.2.2 The Development of PHP and Characters**

The version	Release date	
1.0.0	1995-06-08	Officially called "Personal Home Page Tools (PHP Tools)". This is the first use of the name "PHP".
2.0.0	1997-11-01	Considered by its creator as the "fastest and simplest tool" for creating dynamic web pages. Development moves from one person to multiple developers. Zeev Suraski and Andi Gutmans rewrite the base for this version
3.0.0	1998-06-06	Added more advanced two-stage parse/execute tag-parsing

		system called the Zend engine.
4.0.0	2000-05-22	Added more advanced two-stage parse/execute tag-parsing system called the Zend engine.
4.1.0	2001-12-10	Introduced 'superglobals' (\$_GET, \$_POST, \$_SESSION, etc.)
4.2.0	2002-04-22	Disabled register_globals by default. Data received over the network is not inserted directly into the global namespace anymore, closing possible security holes in applications.
4.3.0	2002-12-27	Introduced the CLI in addition to the CGI.
4.4.0	2005-07-11	Added man pages for phpize and php-config scripts.
4.4.8	2008-01-03	Several security enhancements and bug fixes. Was to be the end of life release for PHP 4. Security updates only until 2008-08-08, if necessary.
4.4.9	2008-08-07	More security enhancements and bug fixes. The last release of the PHP 4.4 series.
5.0.0	2004-07-13	Zend Engine II with a new object model.
5.1.0	2005-11-24	Performance improvements with introduction of compiler variables in re-engineered PHP Engine.
5.2.0	2006-11-02	Enabled the filter extension by default. Native JSON support.
5.2.11	2009-09-16	Bug and security fixes.
5.2.12	2009-12-17	Over 60 bug fixes, including 5 security fixes.
5.2.13	2010-02-25	Bug and security fixes.
5.3.0	2009-06-30	Namespace support; Late static bindings, Jump label (limited goto), Native closures, Native PHP archives (phar), garbage collection for circular references, improved Windows support, sqlite3, mysqlnd as a replacement for libmysql as underlying library for the extensions that work with MySQL, fileinfo as a replacement for mime_magic for better MIME support, the Internationalization extension, and deprecation of ereg extension.

5.3.1	2009-11-19	Over 100 bug fixes, some of which were security fixes as well.
5.3.2	2010-03-04	Includes a large number of bug fixes.
6.00	In process	Unicode support; removal of 'register_globals', 'magic_quotes' and 'safe_mode'; Alternative PHP Cache.

[3]

### **2.3 The Functions of PHP**

PHP implements dynamic pages faster than CGI and Perl. Comparing with other programming languages, making dynamic pages using PHP is embedded into the HTML document procedures to implement, which is more efficient than generated HTML tag using CGI. PHP can also implement the compiled code. The process of compile can encrypt and optimize code to run, which make the code running faster. PHP has many powerful functions, PHP can achieve most functions which CGI contains, and it supports almost all popular databases and operating systems.

### **2.4 The Features of PHP**

PHP's features include:

1. PHP is open source code, and all PHP source code can be found on the Internet.
2. PHP is completely free of charge.
3. PHP language is embedded into HTML language, so it is simple and easy to learn
4. PHP is running on the web server side script so that it can run on UNIX, LINUX, and WINDOWS.
5. PHP occupies fewer system resources.

6. PHP can create dynamic images.

## **2.5 Different Versions of PHP**

There are different versions of PHP mainly contains PHP3, PHP4, PHP5.

### **2.5.1 PHP 3**

The use of the PHP site has been more than 150,000. The reason for this is as follows, first of all, PHP3 has close connections with the Apache server which is widely used. Then, PHP has updated and added new features constantly. Thirdly PHP3 supports almost all mainstream and non-mainstream databases. Fourthly, it can speed the implementation efficiency.

Open Source is a new trend in contemporary society. PHP3 plays an important role in Open Source. PHP is constantly adding new library and updated version suitable for UNIX, LINUX and Windows platforms, and it provides a wealth of new functions which make the design of the program easier.

### **2.5.2 PHP4**

Compared with PHP 3.0, PHP 4.0 is a more efficient and reliable dynamic Web page development tool. The script is more complex, the most notable feature is the increase in speed ratio. The excellent performance is the result of redesign of PHP's scripting engine.

The features and new functions of PHP 4.

1. Alias: In PHP4, you can use reference as a variable, which brings a great deal of flexibility in programming.
2. Expansion of API modules: the API modules of PHP 4 provide the PHP interface

module.

3. Automatic resource release: PHP4 increased the reference counting function, which made PHP 4 own automatic memory management functions and reduce the stress for programme developers.

4. Boolean: PHP 4.0 supports the Boolean type.

5. COM/DCOM support

6. Configuration: Programmer redesigns the PHP and enhances the file of PHP.ini, which makes the file of PHP.ini extremely easy to configure.

7. Encryption support: PHP4 achieves a complete encryption, the function of encryption is a complete mycrypt library, and supports hash functions. Blowfish, TripleDES, MD5, and SHA1 is the encryption algorithm which can be used in PHP 4.0.

8. FTP Support: PHP 4.0 supports FTP. Generally, you will connect a modem to download a large file to provide an interface. However, if you really need, you can use PHP.

9. New functions: PHP 4.0 has many new functions, and it has also enhanced many existing functions. The following are some examples: array\_count\_values () eval () foreach () nclude () ob\_end\_clean () ob\_end\_flush () ob\_get\_contents () ob\_start () strip\_tags () unset ()

10. Here print: PHP 4.0's here print is similar with Perl. Here print is a high-capacity way to print articles. For example, it will not miss any characters in HTML file, such as directory tags.

11. HTTP Session fallback system: Fallback HTTP Session management system is

implemented in PHP 4.0. By default, Session ID is saved by the cookies. If there is no cookies support, or cookies mission fails, Session ID is automatically created and carried by the URL query string.

12. ISAPI support: PHP 4.0 can serve a personalized ISAPI module for IIS plug-in.

### **2.5.3 PHP 5**

PHP 5.0 was released in July, 2004 after the Zend II engine version. There are some new functions in PHP 5.0, such as PHP Date Objects (PDO). PHP 5.0 also enhanced many functions, at first, providing the function of PHP compatibility mode. Secondly, providing the function of XML, PHP5.0 supports direct access to the data of XML named Simple XML. In the third place, it enhances the support for XML Web services and SOAP extension. In the fourth place, in the aspect of database, PHP provides a new interface named MySOLi. In addition to the previous interface, you can also use object-oriented interface, prepared statements (Prepared Statement), other new MySQL functions and bundled with a small capacity RDBMS-SOLite.

Next, I will explain the new object model of PHP 5 and some related examples.

#### **2.5.3.1 New Object Mode**

1. Constructor and destructor
2. Object reference
3. Cloning objects
4. Object in the private, public and protected mode
5. Interfaces

6. Abstract class

7. `__call`

8. `__set` and `__get`

9. Static members

Constructor and destructor

In PHP4, when the function and object have the same name, the function will be the object's constructor. There is no concept of destructor in PHP 4.

In PHP5, the constructor function is named as `__construct` and I also introduced the concept of destructor, which is named as `__destruct`.

Object reference

In PHP4, passing variable to a function or method actually is a copy of this variable. It means that the function or method which you pass is the copy of this variable, unless you use the reference symbol "&" to state that this is only a reference, not a copy.

In PHP5, the object always exists in the form of reference.

Cloning objects

When an object is called in the form of reference, and you want the copy of the object, what can you do? PHP5 offers syntax `__clone`, which is the object of cloning.

The Objects in the private, public and protected mode

In PHP4, all the methods and variables are public objects, which mean you can operate any variables and methods. PHP5 introduced three new ways to control the mode of access right. It contains the mode of Public, Protected and Private.

1. Public Mode: allow operations outside the object.
2. Private mode: only allow the operations by the method in the object.
3. Protected mode: allow the operations by object and its parent object.

## Interfaces

An object can be only inherited once, multiple inherits are not allowed. In PHP5, interface just defines some method name and parameters, then the object can easily use the 'implement' keyword to integrate the interface need, and then add the specific implementation of the code.

## Abstract class

Like other classes, abstract class allows to define variables and methods. Abstract class can also define an abstract method,

### `__call`

PHP5's object has a new method called `__call ()`, this method is used for monitoring an object in the other methods. If you try to call an object which does not exist, `__call` method will be called automatically.

### `__set` and `__get`

`__set` and `__get` methods are a good way to capture an object which does not exist in the variables and methods.



## Static members

The class methods allow to be called when there is no object instantiated. Similarly, the class variables allow controlled independently when there is no object instantiated. (You do not need to use an object ways to control).

## Exceptions

Exception is a good way to deal with errors in a programme, which is contained in Java and C. In PHP5, you can try to use the code of "try" and "catch" to control the errors in the programme. When an error occurs, the code will put error to "catch" clause. In the "catch" clause, you need to put error to the specificity object to deal with, which makes the code structure look clearer, because we put all the error messages to an object to be handled.

### **2.5.3.2 Custom Error Handling**

You can easily handle errors with custom code to control some problems in a program. You only need to derive your own error control from the Exception class. In your own error control class, you need to create a constructor and a getMessage method.

### **2.5.3.3 Namespace**

Namespace can put the related classes or functions together, so that it is easy to call in the future. For example:

```
<?php
    namespace Math
    {
        class Complex
        {
```

```
//...code...  
function __construct()  
{  
    print("hey");  
}  
}  
}  
$m = new Math::Complex();  
?  
?> [4]
```

#### **2.5.3.4 GD library**

GD is a code library for the people to create images and it is an open source which is widely used in the contemporary society. GD library can be used in Perl, PHP and other languages and the written way is similar to C and “wrappers”. GD creates PNG, JPEG and GIF images, among other formats. GD is can also be used for generating charts, graphics, thumbnails, and most anything else, on the fly. [5]

## **3 APACHE SERVER**

### **3.1 The Overview of Apache Server**

The Apache HTTP Server Project is to develop and maintain the open source of HTTP server for operating systems which contain the UNIX and Windows NT. The Apache HTTP Server Project provides a secure, efficient and extensible server environment that provides HTTP services in sync with the current HTTP standards. [6]

Apache server is stem from NCSAhttpd. After being revised many times, Apache server has become the world's most popular web server software and can be widely used in almost all of the computer platforms. The pronunciation of Apache comes from "a patchy server" , which means a server full of patches. Apache server is the open source software, so there are many people developing Apache server's new capabilities, features, and modifying the original defect. The character of Apache server is simple, fast, stable, and it can be used in the proxy server.

Apache has a variety of products that can support SSL technology, multiple virtual hosts. Apache is a process-based structure, the process consumes more than the thread system, and it is not suitable for multi-processor environment. Therefore, when an Apache Web site is expanding, it usually increases or expands a server cluster node rather than increase processor. So far, Apache is still the world's most used web server, the market share is around 60%. Many of the world famous sites such as Amazon.com, Yahoo!, W3 Consortium, Financial Times, all use of Apache. Its success is mainly due to its open source, there is a good team, cross-platform application (can run on almost all Unix, Windows, Linux system platforms) as well as its portability, and so on.



Figure 3.1 The LOGO of Apache HTTP Server

### **3.2 The Features of Apache Server**

Apache web server software has the following features:

1. Supporting the latest HTTP/1.1 protocols
2. It has a simple but powerful file-based configuration process
3. Supporting the common gateway interface
4. Supporting for IP based virtual host-based domain name
5. Supporting a variety of ways of HTTP authentication
6. Integrated Perl processing module
7. Integrated proxy server module

8. Supporting real-time monitoring server status and custom server logs
9. Supporting server-side include directive (SSI)
10. Supporting Security Socket Layer (SSL)
11. Providing the process of tracking user sessions
12. Supporting for FastCGI
13. Supporting Java Servlets through third-party modules

### **3.3 Famous Projects of Apache**

#### 1. HTTP Server

I just introduced in the previous paragraphs.

#### 2. ActiveMQ

ActiveMQ is a free open source written by the java and fit for the JMS1.1 standard.

#### 3. Ant

Ant is the Standard of batch tool.

#### 4. Commons

Commons is a widely used tool for libraries, including the common-pool, dbcp, fileupload, Common-beans and so on.

## 5. Excalibur

The main product of Excalibur is the lightweight, embeddable Inversion of Control container, which is named the Fortress and written by java.

## 6. iBATIS

iBATIS is a very popular ORM tool.

## 7. Geronimo

Geronimo is a compatible j2ee container, which is created by the Apache Software Foundation.

## 8. Jakarta

Jakarta is the combination of many Java subprojects, like tomcat, ant.

## 9. James

James is the mail, newsgroups, news server, which is created by java. The avalon component framework is currently supports SMTP, POP3 and NNTP.

## 10. Logging

Logging is a reliable, fast, strong expansion of the log tool based on java.

## 11. Maven

Maven is project integrated management tool which is created by java, and it is based on the project object model (POM) concept

## 11. Portals

Portal Products

## 12. Struts

Struts build the MVC web application framework through a set of servlets and jsp.

## 13. Tomcat

Tomcat is widely used and the free Java server. [7]

## 4 MYSQL

### 4.1 The Overview of MySQL

MySQL is a small relational database management system, developed by a Swedish company named MySQL AB. Now MySQL is widely used in small and medium sized Internet websites. Since MySQL has the features of small size, high speed, reliable, secure, especially the characteristics of open source, many small and medium sized websites chose the MySQL database as the website in order to reduce the total cost of ownership. The official website of MySQL is: [www.mysql.com](http://www.mysql.com)[8]



Figure 4.1 The LOGO of MySQL



## 4.2 Features and Benefits of MySQL

The features and benefits of MySQL are as follows:

### Scalability and Flexibility

Run anything from:

- (1) Deeply embedded applications with a footprint of just 1MB
- (2) Massive data warehouses holding terabytes of information

### 2. High Performance

- (1). Table and Index Partitioning
- (2). Ultra-fast load utilities
- (3). Distinctive memory caches
- (4). Full-text indexes

### 3. High Availability

- (1). Run high-speed master/slave replication configurations with Row-Based and Hybrid Replication
- (2). Specialized Cluster servers offering instant failover

### 4. Robust Transactional Support

- (1). Complete ACID (atomic, consistent, isolated, durable) transaction support
- (2). Unlimited row-level locking
- (3). Distributed transaction capability
- (4). Multi-version transaction support

### 5. Web and Data Warehouse Strengths

- (1). High-performance query engine

- (2). Tremendously fast data insert capability
- (3). Strong support for specialized web functions, like fast full text searches

#### 6. Strong Data Protection

- (1). Powerful mechanisms
- (2). SSH and SSL support safe and secure connections
- (3). Powerful data encryption and decryption functions

#### 7. Comprehensive Application Development

- (1). Support for stored procedures, triggers, functions, views, cursors, ANSI-standard SQL.
- (2). Plug-in libraries to embed MySQL database support into nearly any application

#### 8. Management Ease

- (1). Use Event Scheduler automatically schedule common recurring SQL-based tasks to execute on the database server
- (2). Average time from software download to complete installation is less than fifteen minutes

#### 9. Open Source Freedom and 24 x 7 Support

- (1). Around-the-clock support and indemnification available through MySQL Network
- (2). Enterprise quality and enterprise ready, from installation to support

#### 10. Lowest Total Cost of Ownership

Save on database licensing costs and hardware expenditures, all while cutting systems downtime. [9]

### **4.3 Some Basic Commands of MySQL**

1. Create a database

```
mysql> create database database name
```

## 2. Create Table

```
mysql> create table table name (  
id int primary key auto_increment,  
... ..,  
);
```

## 3. View all databases

```
mysql> show databases;
```

## 4. Use a database

```
mysql> use database name;
```

## 5. See all the tables which the database uses

```
mysql> show tables;
```

## 6. Display the attribute structure of tables

```
mysql> desc table name;
```

## 7. Select the display data in the table

\* Representatives select all columns,

```
mysql> select * from table name where id =? [and name =? ] [Or name =?];
```

```
mysql> select id, name from table name order by a column name desc (descending,
```

asc is ascending)

#### 8. Delete data in the table

```
mysql> delete from table where id =? [Or name =? (And name =?)];
```

#### 9. Delete table

```
mysql> drop table;
```

#### 10. Delete database

```
mysql> drop database;[10]
```

### **4.4 Precautions When Installing MySQL**

1. If you are using MySQL + Apache and the network operating system is FreeBSD, then when you install the FreeBSD, you should note the problems of the version. Before the version of FreeBSD 3.0, the MIT-pthread in MySQL Source runs normally, but after the version of FreeBSD 3.0, you must use native threads, which is include a with-named-thread-libs =- lc\_r option.
2. If you meet some problems in the process of COMPILE, at first, check whether the version of gcc is 2.81 or above, the version of gmake is 3.75 or above.
3. If it is not the problem of the version, it may be the memory is not enough, please use the. / Configure - with-low-memory.
4. If you want to reconfigure, then you can type rm config.cache and make clean to remove records.

5. People generally put MySQL installed in /usr/local directory, which are the default, you can follow your need to set your installation directory. [11]

## 5 PRACTICE PART

### 5.1 Install the Programming Environment

In Chapter 5, I will introduce how to install the software of Apache, PHP, and MySQL.

#### 5.1.1 Installation of Apache

In my application, I used the Apache2.0.63 as the programming environment. It can be downloaded from the website <http://httpd.apache.org/download.cgi>. Input <http://localhost/> in Firefox (my web server). If the output is like figure 5.1, the Apache will be installed successfully.



您能看见这个页面, 说明Apache web server 已经安装成功。您可以在这个目录中增加内容, 或者把这个页面替

### 这不是你想看见的页面吧?

之所以会看见这个页面, 是因为网站管理员改变了这个站点的设置。如果有疑问, 请咨询维护此站点的人员。所使用的网站服务器软件的开发者, 不负责此站点的维护工作, 也无法为您解决设置上的问题。

Apache [文档](#)已经包含在此发行版中。

您可以在使用Apache的网站服务器上, 自由地使用下面的图片。感谢使用Apache!



Figure 5.1 Successful install Apache

### 5.1.2 Installation of MySQL

Then, I used MySQL to set up the database and voted data was saved in MySQL. It can be downloading from the website <http://dev.mysql.com/downloads/mysql/5.1.html>. Server Host is localhost. Both username and password are all root, which is just like in Figure 5.2.

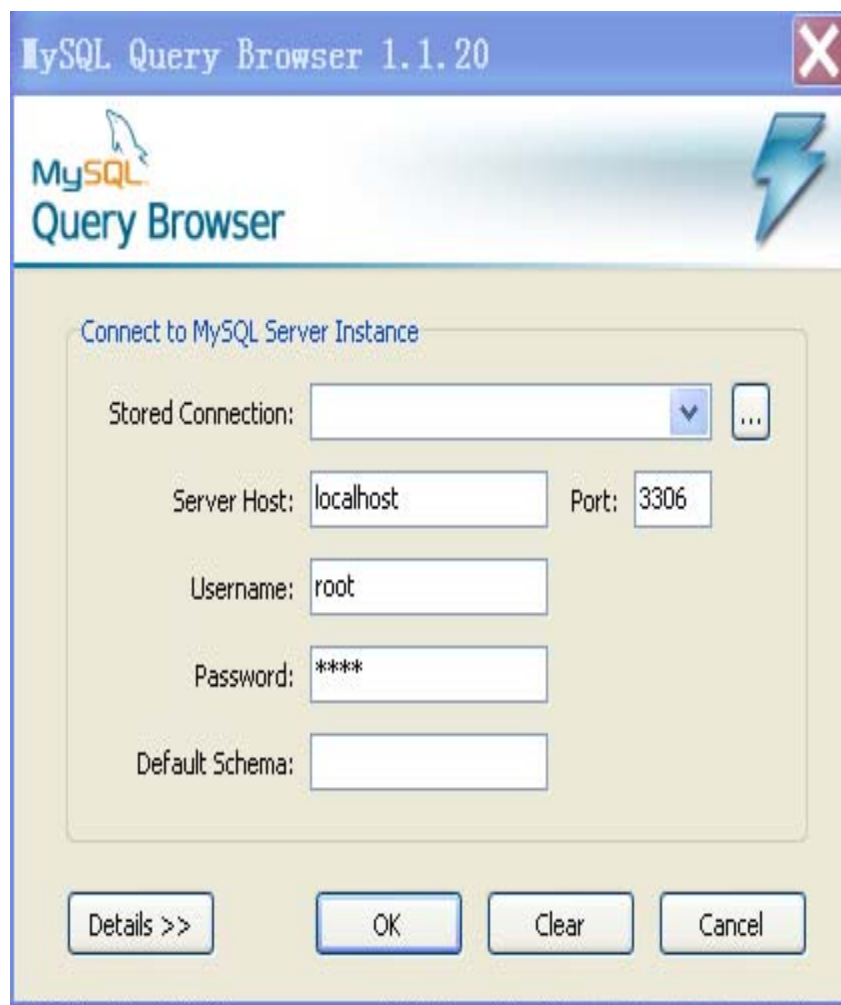


Figure 5.2 Log in MySQL

### 5.1.3 Installation of PHP

In the third place, I used PHP 5.2.13 as the programme language. It can be downloading from the website <http://www.php.net/downloads.php>. I generated the lines, rectangles, and text items using PHP..


### 5.1.4 Setting up Connection

It is very important and necessary to set up a connection between three softwares.

1. Find the file `php.ini-dist` in PHP folder and rename it to `php.ini`. Then copy this file to `C:\WINDOWS`
2. Find the file `php5ts.dll` in PHP folder, and copy this file to `C:\WINDOWS\system32`
3. Copy the file of `php_gd2.dll`, `php_mysql.dll`, `php_mystring.dll` from folder of PHP\ext to `C:\WINDOWS\system32`
4. Find the file of `C:\Apache2\conf\httpd.conf`, search the sentence of “`DirectoryIndex index.html index.html.var`”, and then add “`index.php`” to the back of the sentence.
5. Find the file of `C:\Apache2\conf\httpd.conf`, search the sentence of “`#LoadModule ssl_module modules/mod_ssl.so`”. In the next row, add the sentence of “`LoadModule php5_module C:/php5/php5apache2.dll`”. The file of `php5apache2.dll` is locate in `C:/php5/php5apache2.dll`
6. Find the file of `C:\Apache2\conf\httpd.conf`, search the sentence of “`AddType application/x-gzip .gz .tgz`”. In the next row, add the sentence of “`AddType application/x-httpd-php .php`”.
7. Build a file of `test.php` in the folder of `C:\Apache2\htdocs\zhaoyue`. Write `<? echo phpinfo(); ?>` in this file.
8. Restart the Apache. Input `http://localhost/zhaoyue/test.php` in Firefox (my web server). If the output is like figure 5.2, the connection between Apache and PHP is



built.



<b>System</b>	Windows NT DBTOA000 5.1 build 2600
<b>Build Date</b>	Feb 24 2010 14:30:19
<b>Configure Command</b>	cscript /nologo configure.js "--enable-snapshot-build" "--enable-debug-pack" "--with-snapshot-template=d:\php-sdk\snap_5_2\vc6\x86\template" "--with-php-build=d:\php-sdk\snap_5_2\vc6\x86\php_build" "--with-pdo-oci=D:\php-sdk\oracle\instantclient10\sdk,shared" "--with-oci8=D:\php-sdk\oracle\instantclient10\sdk,shared" "--without-pi3web" "--enable-mongo=shared"
<b>Server API</b>	Apache 2.0 Handler
<b>Virtual Directory Support</b>	enabled
<b>Configuration File (php.ini) Path</b>	C:\WINDOWS
<b>Loaded Configuration File</b>	C:\WINDOWS\php.ini
<b>Scan this dir for additional .ini files</b>	(none)
<b>additional .ini files parsed</b>	(none)
<b>PHP API</b>	20041225
<b>PHP Extension</b>	20060613
<b>Zend Extension</b>	220060519
<b>Debug Build</b>	no
<b>Thread Safety</b>	enabled

Figure 5.3 Connection with PHP and Apache

9. Find the file of php.ini in the folder of C:\windows, search the sentence of “;extension=php\_mysql.dll”, “;extension=php\_gd2.dll”, “;session.save\_path = /tmp”, “;extension=php\_mystring.dll”, delete the symbol of “;” in each sentence.

Modify the sentence of “extension\_dir = \".\” into “extension\_dir = C:\php5\ext”.

10. Copy the file of libmysql.dll in folder of C:\PHP5 to the folder of C:\WINDOWS\system32

11. Restart the Apache, and build a file of testdb.php in the folder of C:\Apache2\htdocs\zhaoyue. Write

```
<?php
$link=mysql_connect('localhost','root','root');
if(!$link) echo "fail";
else echo "success";
mysql_close();
?>
```

12. Input <http://localhost/testdb.php> Firefox (my web server). If the output is like figure 5.3, the connection between MySQL and PHP is built. [12]



Figure 5.4 Connection with MySQL and PHP

## 5.2 Setting up MySQL Database

I set up a MySQL database called MVP. It contains one table called MVP\_results, which holds the candidates' names in the candidate column, and the number of votes they have received in the num\_votes column. My Server Host is localhost, both user name and password is root. This database contains five candidates. The detailed information of the candidates is as follows:

### MVP candidates

Name	Team	PPG	RPG	APG
LeBron James	Cleveland Cavaliers	29.7	7.3	8.6
Dwyane Wade	Miami Heat	26.5	4.9	6.5
Kobe Bryant	L.A. Lakers	27.0	5.4	5.0
Dwight Howard	Orlando Magic	18.0	13.2	1.7
Dirk Nowitzki	Dallas Mavericks	24.7	7.7	2.7

[13]

PPG: Points Per Game

RPG: Rebounds Per Game

APG: Assists Per Game

Next, I will create MySQL database called MVP.

After it was running, the MySQL was shown in Figure 5.5 and Figure 5.6. The information of each candidate is shown clearly, containing Name, Team, Points Per Game, Rebounds Per Game, Assists Per Game, and the numbers of votes.

MySQL Query Browser - root@localhost:3306 / mvp

File Edit View Query Script Tools Window Help

Go back Next Refresh

```
SELECT * FROM mvp_results m;
```

Resultset 1

candidate	team	PPG
LeBron James	Cleveland Cavaliers	29.7/PPG
Dwyane Wade	Miami Heat	26.5/PPG
Kobe Bryant	L.A. Lakers	27.0/PPG
Dwight Howard	Orlando Magic	18.0/PPG
Dirk Nowitzki	Dallas Mavericks	24.7/PPG

Figure 5.5 Information of Candidates 1

MySQL Query Browser - root@localhost:3306 / mvp

File Edit View Query Script Tools Window Help

Go back Next Refresh

```
SELECT * FROM mvp_results m;
```

Resultset 1

RPG	APG	num_votes
7.3/RPG	8.6/APG	8
4.9/RPG	6.5/APG	2
5.4/RPG	5.0/APG	6
13.2/RPG	1.7/APG	7
7.7/RPG	2.7/APG	17

Figure 5.6 Information of Candidates 2

At first, each candidate's num\_votes is 0. After people vote for them, the num\_votes will be added. It is important to note that in the process of setting up MySQL database, you should click the button of Execute after input every sentence, so that you can finish the whole programme successfully. The database is finished and then I provide a voting interface via a page called vote.html.

### 5.3 Creating the Page of NBA MVP 09—10

The output is shown in Figure 5.7.



## NBA MVP 09-10

Who will you vote for MVP in NBA between 2009 to 2010?

- LeBron James 29.7/PPG 7.3/RPG 8.6/APG Team:Cleveland Cavaliers
- Dwyane Wade 26.5/PPG 4.9/RPG 6.5/APG Team:Miami Heat
- Kobe Bryant 27.0/PPG 5.4/RPG 5.0/APG Team:L.A. Lakers
- Dwight Howard 18.0/PPG 13.2/RPG 1.7/APG Team:Orlando Magic
- Dirk Nowitzki 24.7/PPG 7.7/RPG 2.7/APG Team:Dallas Mavericks

Show results

Figure 5.7 The Page of MVP 09—10

This part is easy to create, using some basic knowledge related to setting up a HTML with words and buttons.

#### 5.4.1 Creating the Page of Show MVP

My idea is that when people choose their favorite basketball player and then click the button of show results, the number will be added to the MySQL database. I get all the votes out of the MySQL database which contains other people voting, and draw the bar chart with some color, word and the percentages of each player change in current results.

Typical output after some votes have been cast is shown in Figure 5.8.

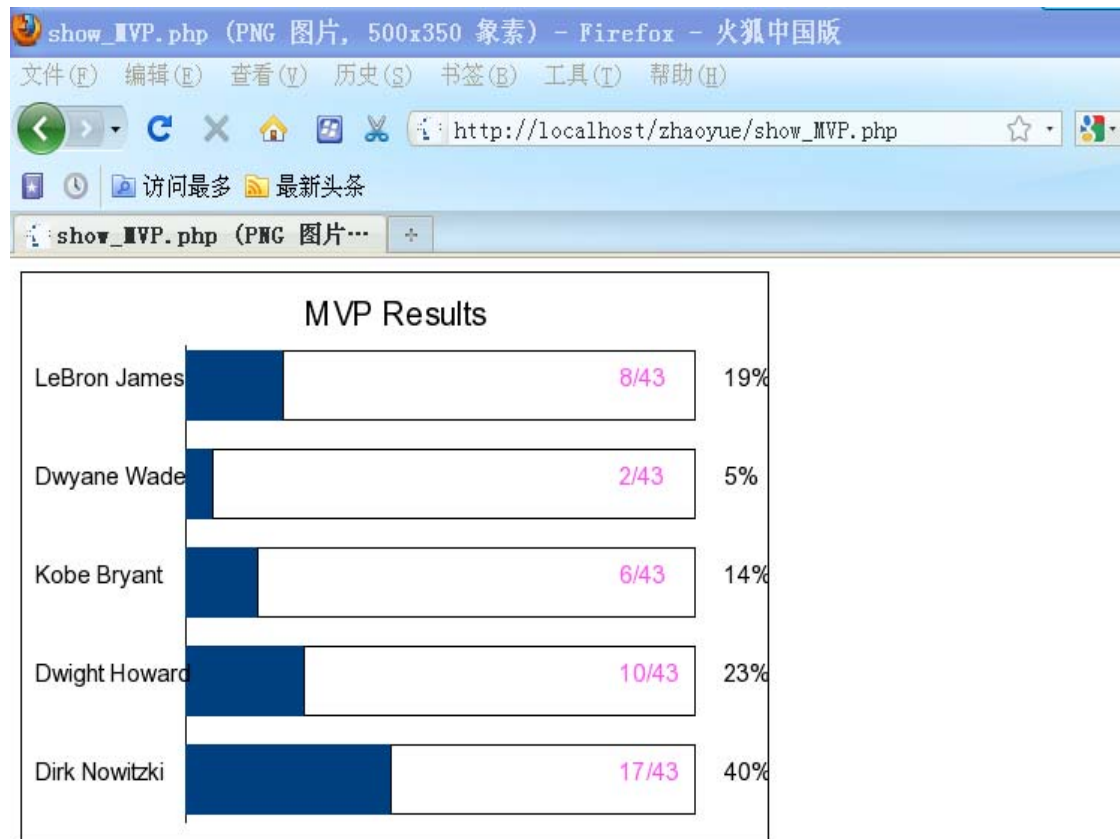


Figure 5.8 The Page of show\_MVP

The script that generates this image is quite long. I have split it into four parts, and I will discuss each part separately.

#### **5.4.2 Updates the Vote Databases and Retrieves the New Results**

In part 1, I finished three important works:

Connect to the MySQL database

Update the votes according to what the people typed,

Get the new votes.

There are some important problems which we should notice. In part of log into the database, add people's votes and get current results. There are three sentences;

1. echo' Could not connect to db1
2. echo' Could not connect to db2
3. echo' Could not connect to db3

The reason why I separate it into three sentences is in order to search errors easily, so that I can know where the error is and correct it directly.

#### **5.4.3 Sets up All the Variables**

In part 2, I began to make calculations so that I would start to draw the images.

I set up some variables which were prepared for drawing the image.

The variables are as follows:

1. The total width of the canvas: \$width
2. The left margins: \$left\_margin

3. The right margins:  $\$right\_margin$
4. The fatness between bars:  $\$bar\_height$
5. The spacing between bars:  $\$bar\_spacing$
6. The font:  $\$font$ .

The font, font sizes, and label position:  $\$font$ ,  $\$title\_size$ ,  $\$main\_size$ ,  $\$small\_size$ , and  $\$text\_indent$ .

I can start to make calculations after I own these basic values above.

My plan is, firstly build a baseline from which the five bars stretch out. Then, I can use the left margin plus an allowance for the text labels for the X coordinate and an estimate from our sketch for the Y coordinate. After that, I can calculate the position of the baseline.

I also solved two important problems: the first one was the distance on the graph

$$\$bar\_unit = (\$width - (\$X + \$right\_margin)) / 100;$$

The reason why divided it into 100 is I want to explain the percentage values. 100 is the length between baseline and the right margin, which is also the maximum length of the bars.

The other one is the total height which I need for the canvas:

$$\$height = \$num\_candidates * (\$bar\_height + \$bar\_spacing) + 50;$$

$\$height$  is the height per bar times the number of bars, plus an extra amount for the title.



#### 5.4.4 Sets up All the Graph

In part 3, I finished the work of building the basic graph, after that I was prepared to draw the image.

```
ImageFilledRectangle($im, 0, 0, $width, $height, $bg_color);
```

The functions of ImageFilledRectangle() is mainly drawing a filled-in rectangle. There are two important factors, one is the image identifier. Giving it with the coordinates of X and Y, which is the start point (upper-left corner) and the end point (lower-right corner) of the rectangle. The other one is fill the canvas with the background color. I use white as the background color here.

```
ImageRectangle($im, 0, 0, $width-1, $height-1, $line_color);
```

The function of ImageRectangle () draws an outlined rectangle. There is one important factor we should note is drawing the rectangle from the \$width-1 and \$height-1, so that I can start to draw the canvas from (0, 0). Otherwise the rectangle will be shown outside the canvas if drawn it to \$width and \$height.

At last, I drew the baseline using the function of ImageLine().

```
ImageLine($im, $x, $y-5, $x, $height-15, $line_color);
```

\$im describes the coordinates from (\$x, \$y-5) to (\$x, \$height-15) and \$line\_color describes the line color.

In part 3, I finished the work of drawing the baseline from the first bar to the bottom of the canvas.

#### 5.4.5 Draws the Actual Data onto the Graph

In part 4, looking the basketball player from the database, solving vote's percentage, and drawing every basketball player's own bars and labels.

At last, I can use ImagePNG() to output the picture and ImageDestory() to clean up.

### 5.5 The Change of Images

There are Figure 5.10, Figure 5.11 and Figure 5.12 to show the changes after the voting.

In the first place, after the last person voted, the results of the image can be seen in Figure5.9.

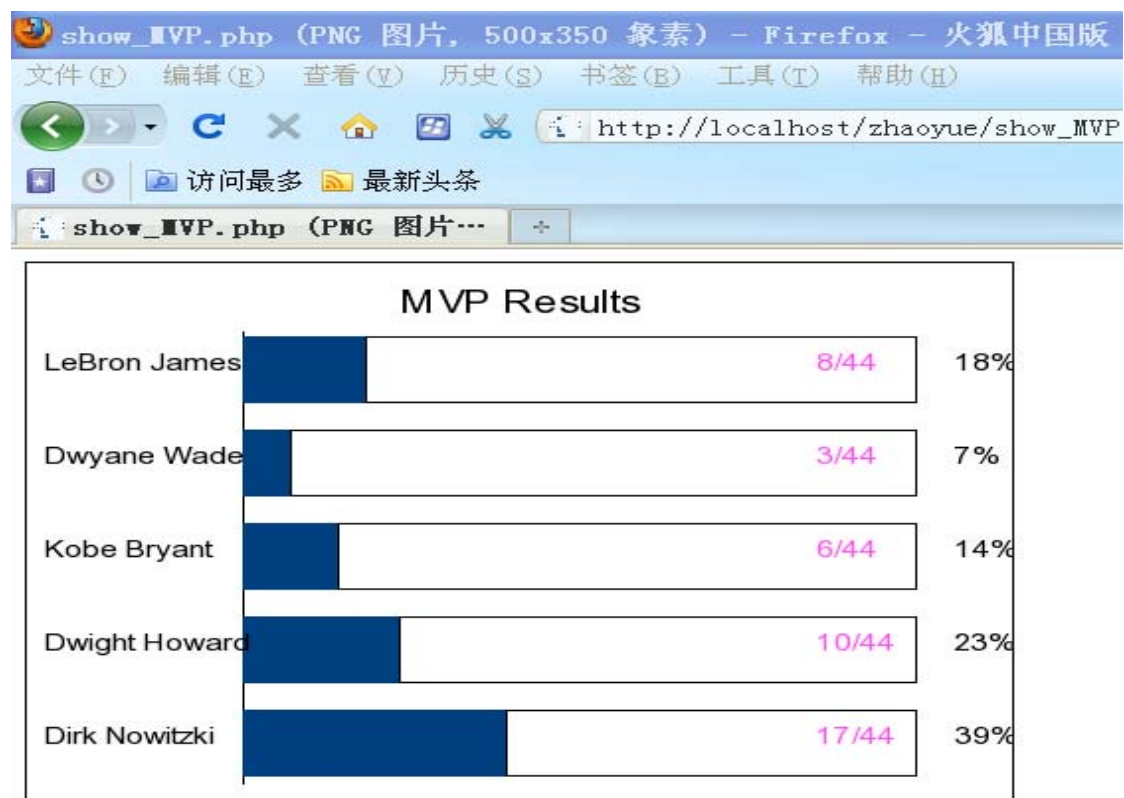


Figure 5.9 Before vote

In the second place, one person votes Dwyane Wade as MVP.



## NBA MVP 09-10

Who will you vote for MVP in NBA between 2009 to 2010?

- LeBron James 29.7/PPG 7.3/RPG 8.6/APG Team:Cleveland Cavaliers
- Dwyane Wade 26.5/PPG 4.9/RPG 6.5/APG Team:Miami Heat
- Kobe Bryant 27.0/PPG 5.4/RPG 5.0/APG Team:L. A. Lakers
- Dwight Howard 18.0/PPG 13.2/RPG 1.7/APG Team:Orlando Magic
- Dirk Nowitzki 24.7/PPG 7.7/RPG 2.7/APG Team:Dallas Mavericks

Show results

Figure 5.10 Voting

At last, the changes in the aspect of numbers of each basketball superstar and the length of each bar chart between Figure 5.9 and Figure 5.11 can be clearly seen below.

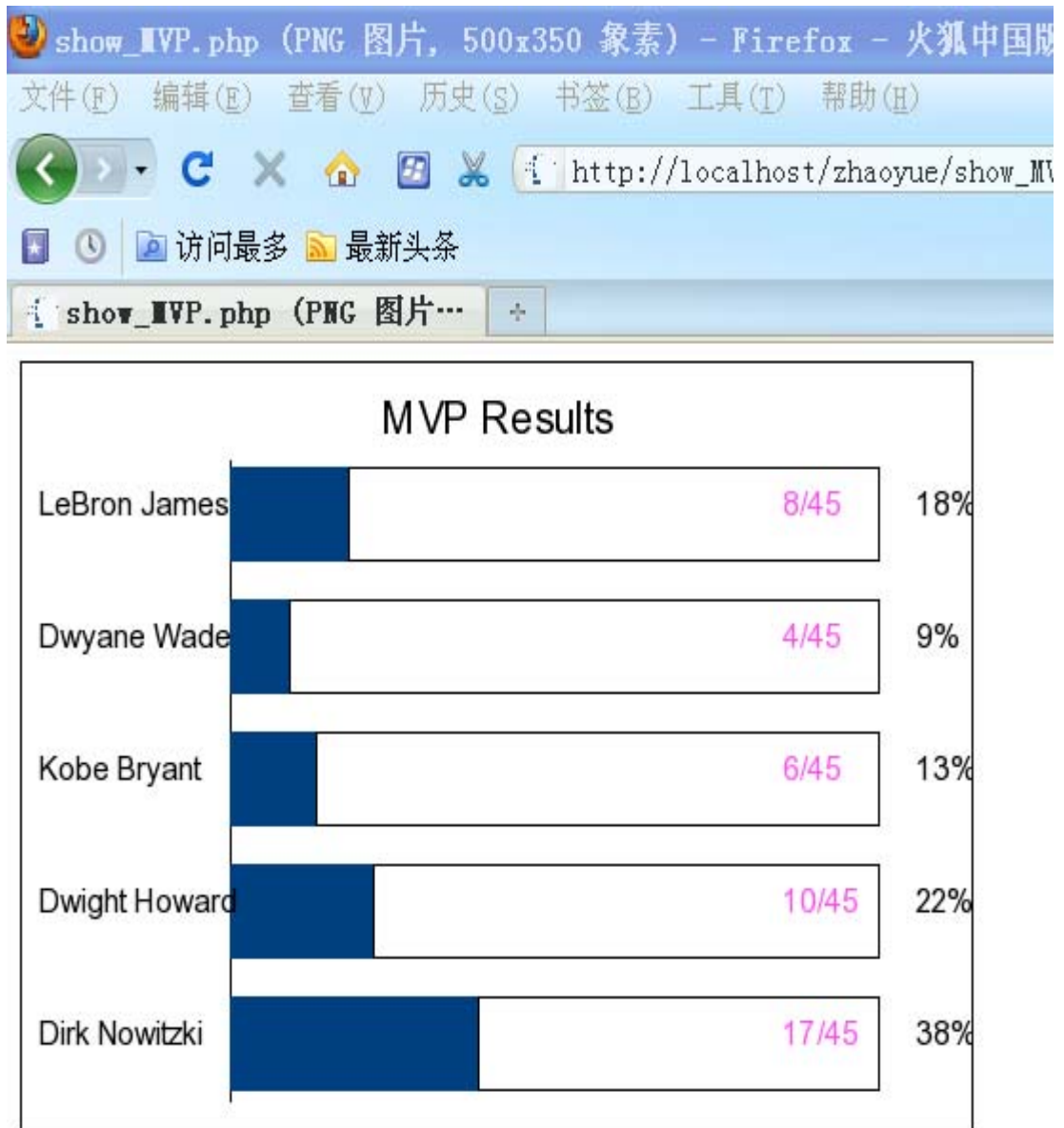


Figure 5.11 After voting

## 6. CONCLUSION

The aim of my study was to learn the PHP language and the basic techniques on how to generate images using GD2 library. The more practical aim of the thesis was to build a voting system where I use GD2 library to generate graphical representation from MySQL database table. There were many challenges during the thesis process. Luckily, I finally resolved all of them. Next, I will illustrate my main challenges.

Firstly, I met a connection problem between PHP, Apache and MySQL when I was downloading and installing the three software applications to the device. It did not work at all. Then I knew I need copy, rename, revise and test some files. The details had been written in Chapter 5. After that, it ran well.

The second problem was, at first, I had no idea about this thesis and did not know what I can do. Then, I read some books and searched the related knowledge on the Internet, especially some knowledge and examples related to how to generate images using PHP. I gradually knew how to finish my thesis. The most important is that my tutor Timo Mynttinen gave me many good suggestions. He told me what I can do. In the process of finishing my thesis, I usually discussed some challenges with Timo Mynttinen. He really taught me a lot about the entire thesis and he is one of my most respected teachers.

**REFERENCES:**

- [1]<http://www.xn--b0tv54chzczzfcnb560b.com/wangyesheji/shanghai/%E7%BD%91%E9%A1%B5%E8%AE%BE%E8%AE%A1%E6%9C%AF%E8%AF%AD.html>
- [2]<http://php.net/manual/en/history.php.php>
- [3]<http://en.wikipedia.org/wiki/PHP>
- [4][http://www.cncfan.com/html/?79\\_7807.html](http://www.cncfan.com/html/?79_7807.html)
- [5]<http://www.boutell.com/gd/>
- [6]<http://httpd.apache.org/>
- [7]<http://www.apache.org/>
- [8]<http://www.sun.com/software/products/mysql/index.jsp>
- [9]<http://en.wikipedia.org/wiki/MySQL>
- [10]<http://baike.baidu.com/view/24816.htm>
- [11]<http://www.51cto.com/art/200511/12497.htm>
- [12]<http://zhidao.baidu.com/question/69294310.html>
- [13]<http://data.nba.tom.com/html/allplayers.html>

**APPENDIX-1**

```
create database MVP;
use MVP;
create table MVP_results(
candidate varchar(30),
team varchar(30),
PPG varchar(30),
RPG varchar(30),
APG varchar(30),
num_votes int
);
insert into MVP_results values
('LeBron James','Cleveland Cavaliers','29.7/PPG','7.3/RPG','8.6APG',0),
('Dwyane Wade','Miami Heat','26.5/PPG','4.9/RPG','6.5/APG',0),
('Kobe Bryant','L.A. Lakers','27.0/PPG','5.4/RPG','5.0/APG',0),
('Dwight Howard','Orlando Magic','18.0/PPG','13.2/RPG','1.7/APG',0),
('Dirk Nowitzki','Dallas Mavericks','24.7/PPG','7.7/RPG','2.7/APG',0)
;
grant all privileges
on MVP.*
to root@localhost
identified by 'MVP';
```

**APPENDIX-2**

```

<html>
<head>
<title>MVP 09-10</title>
<head>
<body>
<h1>NBA MVP 09-10</h1>
<p>Who will you vote for MVP in NBA between 2009 to 2010?</p>
<form method="post" action="show_MVP.php">
<input type="radio" name="vote" value="LeBron James">LeBron James
29.7/PPG 7.3/RPG 8.6/APG Team: Cleveland Cavaliers <br/><br/>

<input type="radio" name="vote" value="Dwyane Wade">Dwyane Wade
26.5/PPG 4.9/RPG 6.5/APG Team: Miami Heat <br/><br/>

<input type="radio" name="vote" value="Kobe Bryant">Kobe Bryant
27.0/PPG 5.4/RPG 5.0/APG Team: L.A. Lakers<br/><br/>

<input type="radio" name="vote" value="Dwight Howard">Dwight Howard
18.0/PPG 13.2/RPG 1.7/APG Team: Orlando Magic<br/><br/>

<input type="radio" name="vote" value="Dirk Nowitzki">Dirk Nowitzki
24.7/PPG 7.7/RPG 2.7/APG Team: Dallas Mavericks<br/><br/><br/>

<input type="submit" value="Show results">

</form>
</body>

```



**Appendix A-3**

```
<?php
```

```
$vote=$HTTP_POST_VARS['vote'];
```

```
if(!$db_conn= @mysql_connect( 'localhost' , 'root', 'root'))
```

```
{
```

```
echo'Could not connect to db1<br/>';
```

```
exit;
```

```
};
```

```
@mysql_select_db('MVP');
```

```
if(!empty($vote))
```

```
{
```

```
$vote=addslashes($vote);
```

```
$query="update MVP_results
```

```
        set num_votes=num_votes+1
```

```
        where candidate='$vote'";
```

```
if(!($result=@mysql_query($query,$db_conn)))
```

```
{
```

```
echo'Could not connect to db2<br/>';
```

```
exit;
```

```
}
```

```
};
```

```
$query='select*from MVP_results';
```

```
if(!($result=@mysql_query($query,$db_conn)))
```

```
{
```

```
echo'Could not connect to db3<br/>';
```

```
exit;
```

```
}  
$num_candidates=mysql_num_rows($result);  
$total_votes=0;  
while($row=mysql_fetch_object($result))  
{  
$total_votes+=$row->num_votes;  
}  
  
mysql_data_seek($result,0);  
  
putenv('GDFONTPATH=C:\winnt\Fonts');  
  
$width=500;  
  
$left_margin=50;  
$right_margin=50;  
$bar_height=40;  
$bar_spacing=$bar_height/2;  
$font='c:\windows\fonts\Arial.ttf '  
$title_size=16;  
$main_size=12;  
$small_size=12;  
$text_indent=10;  
$x=$left_margin+60;  
$y=50;  
$bar_unit=($width-($x+$right_margin))/100;  
$height=$num_candidates*($bar_height+$bar_spacing)+50;  
  
$im=imagecreate($width,$height);  
$white=ImageColorAllocate($im,255,255,255);  
$blue=ImageColorAllocate($im,0,64,128);
```

```

$black=ImageColorAllocate($im,0,0,0);
$pink=ImageColorAllocate($im,255,78,243);
$text_color=$black;
$percent_color=$black;
$bg_color=$white;
$line_color=$black;
$bar_color=$blue;
$number_color=$pink;

ImageFilledRectangle ($im,0,0,$width,$height,$bg_color);

ImageRectangle($im,0,0,$width-1,$height-1,$line_color);

$title='MVP Results';
$title_dimensions=ImageTTFBBox($title_size,0,$font,$title);
$title_length=$title_dimensions[2]-$title_dimensions[0];
$title_height=abs($title_dimensions[7]-$title_dimensions[1]);
$title_above_line=abs($title_dimensions[7]);
$title_x=($width-$title_length)/2;
$title_y=($y-$title_height)/2+$title_above_line;
ImageTTFText($im,$title_size,0,$title_x,$title_y,$text_color,$font,$title);
ImageLine($im,$x,$y-5,$x,$height-15,$line_color);
while($row=mysql_fetch_object($result))
{
if($total_votes>0)
$percent=intval(round(($row->num_votes/$total_votes)*100));
else
$percent=0;

ImageTTFText($im,$main_size,0,$width-30,$y+($bar_height/2),
$percent_color,$font,$percent.'%');

```

```
if ($total_votes>0)
$right_value=intval(round(($row->num_votes/$total_votes)*100));
else
$right_value=0;
$bar_length=$x+($right_value*$bar_unit);
ImageFilledRectangle($im,$x,$y-2,$bar_length,$y+$bar_height,$bar_color);
ImageTTFText($im,$main_size,0,$text_indent,$y+($bar_height/2),
$text_color,$font,$row->candidate);
ImageRectangle($im,$bar_length+1,$y-2,
($x+(100*$bar_unit)), $y+$bar_height,$line_color);
ImageTTFText($im,$small_size,0,$x+(100*$bar_unit)-50,$y+($bar_height/2),
$number_color,$font,$row->num_votes.'/'.$total_votes);
$y=$y+($bar_height+$bar_spacing);
}

Header('Content-type: image/png');
ImagePng($im);

ImageDestroy($im);

?>
```