**S R M U N I V E R S I T Y**

**Kattankulathur – 603 203**

**Department of Information Technology**

**IT1020: WEB SYSTEMS AND TECHNOLOGY**

**General Instructions:**

1. Student should make a web site right from the start of the first exercise to the end consistently maintaining same content as objective.

2. The project should have minimum 5 pages with first page being home page.

3. Submit the project title within 3 working days.

4. Maximum two students are permitted in a team.

5. Draw the page design, mention the control name and all the properties and coding in the observation before coming to the lab.

6. Complete the Lab experiment on the same day itself.

**0. Understanding the functionality of web clients and web servers.**

Server Side: Install XAMPP software and Host a sample website (Use sample templates) in Apache Server

Client Side: Install Firebug plugins in Mozilla Firefox browser and explore the developer's options

**Lab 1:**

**1. a) Create a login page for your project using HTML.**

**b) Create a user registration page of the project with all possible form elements.**

Hint:

* Create a banner for page header using any image editor (Photoshop, MS Paint, etc.)
* Create a footer content
* HTML tags: paragraph, h1 to h6, anchor, fonts, lists
* Form elements: input box, password, list box, check box, button, radio button, option button.
* HTML 5: audio, video tags
* Layouts using tables, div and span, HTML structural elements.

**Sample Web Site:**

**SRM Online Library Management System**

**Steps:**

**1. Install XAMPP Control Panel.**

**2. Install notepad++ or Aptana Studio.**

**3. Create a folder under *c:\xampp\htdocs* path and name it as your project title.**

***Eg.: c:\xampp\htdocs\SRMLibrary***

**4. Create the following folders in your project folder to store the supporting files of your project.**

**Eg.:**

***c:\xampp\htdocs\SRMLibrary\css***

***c:\xampp\htdocs\SRMLibrary\images***

***c:\xampp\htdocs\SRMLibrary\modules***

**5. Create/download images for your project (Eg.: header, footer, etc.) using image editors. (Eg.: MS-Paint, Photo Shop, etc.)**

**6. Save the images in the images folder of your project folder.**

***Eg.: c:\xampp\htdocs\SRMLibrary\images***

**7. Create a html file, *userlogin.html* in your project folder.**

***c:\xampp\htdocs\SRMLibrary\userlogin.html***



<!DOCTYPE html>

<html lang**=**"en">

<head>

<meta charset**=**"UTF-8">

<title>SRM University, Online Library Management</title>

</head>

<body topmargin**=**0 >

<div>

<div>

<img src**=**"images/SRMEmblem.jpg" Align**=**"left">

<h1>&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;Online Library Management</h1>

</div>

<div>

<br>

<h2>SRM Library</h2>

<p>SRM University has an excellent library for the benefit of students, faculties and researchers. As one of the best established libraries according to International Standards, the University Library has a large collection of books covering various branches of Engineering and Technology, Medical and Health Sciences and Science and Humanities and its related fields.</p>

<p>The library is located in the 15-Storey University Administrative Block, and is spread over Ground + 3 floors of 1.50 Lakh sq ft area. The library building is

<ul>

<li>Fully air-conditioned and automated with RFID (Radio Frequency Identification) technology</li>

<li>Well protected with fire alarms and CCTV security systems</li>

<li>Equipped with reading halls in all the floors, with reference collection</li>

</ul>

</p>

</div>

<form action**=**"CheckUserLogin.php" method**=**"POST">

<table valign**=**"left" border**=**"0" cellspacing**=**"4" cellpadding**=**"4">

<tr><td><b>User Name</b></td><td><input type**=**"text" name**=**"uname"></tr>

<tr><td><b>Password</b></td><td><input type**=**"password" name**=**"pwd"></tr>

<tr><td></td><td><input type**=**"submit" value**=**" Sign in " name**=**"btnnewuser">&nbsp;&nbsp;&nbsp;<a href**=**"NewUser.html">New User Sign up</a></tr>

</table>

</form>

</div>

<div class**=**"footer">

<p> &copy; 2017 Online Library | Developed by M.Anand, Asst. Prof. (Sr. G), Dept. of Information Technology, SRM University</p>

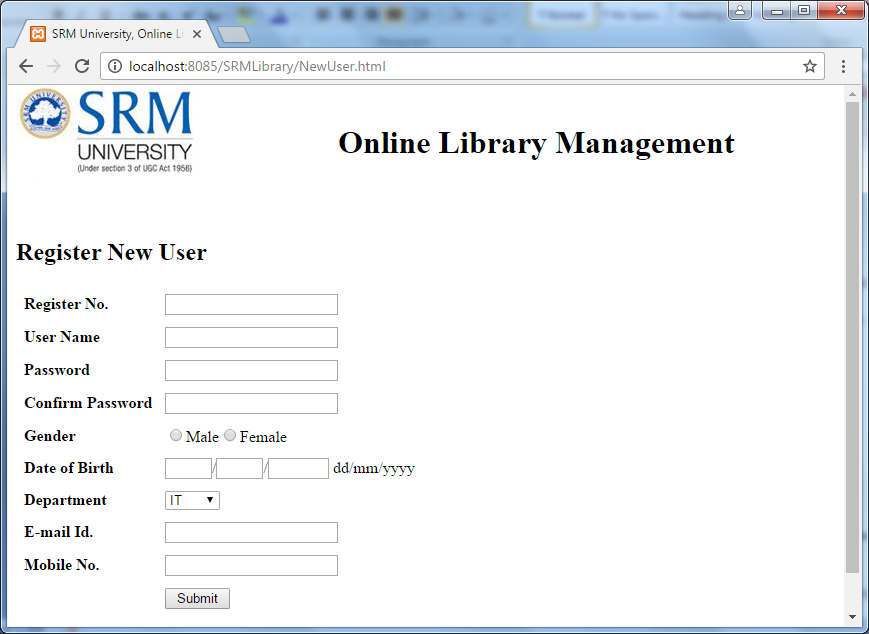
</div>

</body>

</html>

**8. Create a *newuser.html* file in your project folder.**

***c:\xampp\htdocs\SRMLibrary\newuser.html***



<!DOCTYPE html>

<html lang**=**"en">

<head>

<meta charset**=**"UTF-8">

<title>SRM University, Online Library Management</title>

</head>

<body topmargin**=**0 >

<div>

<div>

<img src**=**"images/SRMEmblem.jpg" align**=**"left">

<br>

<h1>&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;Online Library Management</h1>

</div>

<div>

<br><br>

<h2>Register New User</h2>

<form action**=**'SaveNewUser.php' method**=**'POST'>

<table valign**=**"left" border**=**"0" cellspacing**=**"4" cellpadding**=**"4">

<tr><td><b>Register No.</b></td><td><input type**=**"text" name**=**"regno"></td></tr>

<tr><td><b>User Name</b></td><td><input type**=**"text" name**=**"uname"></td></tr>

<tr><td><b>Password</b></td><td><input type**=**"password" name**=**"pwd"></td></tr>

<tr><td><b>Confirm Password</b></td><td><input type**=**"password" name**=**"cpwd"></td></tr>

<tr><td><b>Gender</b></td><td><input type**=**"radio" name**=**"gender" value**=**"Male">Male<input type**=**"radio" name**=**"gender" value**=**"Female">Female</td></tr>

<tr><td><b>Date of Birth</b></td><td><input type**=**"text" name**=**"dd" size**=**"2">/<input type**=**"text" name**=**"mm" size**=**"2">/<input type**=**"text" name**=**"yy" size**=**"4"> dd/mm/yyyy</td></tr>

<tr><td><b>Department</b></td><td><select name**=**"dept"><option>IT</option><option>CSE</option><option>SWE</option><option>ECE</option></td></tr>

<tr><td><b>E-mail Id.</b></td><td><input type**=**"text" name**=**"email"></tr>

<tr><td><b>Mobile No.</b></td><td><input type**=**"text" name**=**"mobile"></tr>

<tr><td></td><td><input type**=**"submit" value**=**" Submit " name**=**"btnsubmit"></td></tr>

</table>

</form>

</div>

</div>

<div>

<p> &copy; 2017 Online Library | Developed by M.Anand, Asst. Prof. (Sr. G), Dept. of Information Technology, SRM University</p>

</div>

</body>

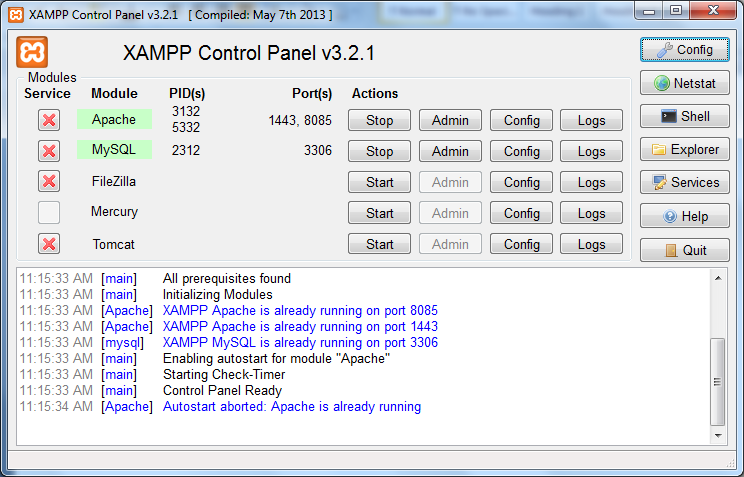
</html>

**9. To execute the web page, open any web browser and type the web address.**

**Eg.:**

***Step 1) Start the Apache Server module***

***Step 2) http://localhost:8085/SRMLibrary/UserLogin.html***

****

**Lab 2:**

**2. a) Format the login page using CSS 3.0**

**b) Format the user registration page using CSS 3.0**

Hint:

* Styling
  + Font
  + Color
  + Background
* Alignment
  + Box model
* Positioning
  + Static
  + Relative
  + Absolute
  + Fixed
  + Float

**10. Create an external CSS (*MyStyle.css*) and store it in your *css* folder.**

***c:\xampp\htdocs\SRMLibrary\css\MyStyle.css***

body**{**

font**:** 12px verdana**,** sans-serif**;**

margin**:** 0px**;**

**}**

.container**{**

width**:** 1024px**;**

margin**:** 0 auto**;**

background-color**:** #bbd2df**;**

**}**

.header1**{**

background-color**:** #679BB7**;**

min-height**:** 20px**;**

background**:** url(..**/**images**/**header\_img.jpg)**;**

**}**

.header1 h1**{**

font-size**:** 18px**;**

margin**:** 0px**;**

**}**

.header2**{**

background-color**:** #ffffff**;**

min-height**:** 75px**;**

margin**:** 0px**;**

**}**

.header2 h1**{**

font-size**:** 28px**;**

color**:** #7a00cc**;**

margin-top**:**5px**;**

margin-left**:**20px**;**

**}**

.header2 img**{**

float**:** left**;**

font-size**:**18px**;**

margin**:** 0px**;**

**}**

.header3**{**

background-color**:** #679BB7**;**

min-height**:** 50px**;**

background**:** url(..**/**images**/**header\_img.jpg)**;**

**}**

.sidebar1**{**

float**:** left**;**

width**:** 262px**;**

min-height**:** 425px**;**

text-align**:** left**;**

background-color**:** #bbd2df**;**

**}**

.sidebar1 .nav**{**

padding**:** 5px**;**

**}**

.sidebarinfo1**{**

width**:** 233px**;**

min-height**:** 20px**;**

text-align**:** left**;**

border**:** 1px solid white**;**

padding**:** 3px**;**

border-radius**:** 5px**;**

background**:** #e6f2ff**;**

**}**

.sidebar1 .nav table **{**

border-collapse**:** collapse**;**

**}**

.nav ul**{**

float**:** left**;**

list-style**:** none**;**

display**:** inline**;**

padding**:** 0px**;**

margin**:** 0px**;**

**}**

.nav ul li**{**

margin-bottom**:** 5px**;**

width**:** 100%**;**

float**:** left**;**

**}**

.nav ul li a**{**

color**:** #3d677e**;**

**}**

.nav ul li a**:**hover**{**

text-decoration**:** none**;**

**}**

.content**{**

float**:** left**;**

width**:** 500px**;**

min-height**:** 400px**;**

object-fit**:**cover**;**

background-color**:** #e6f2ff**;**

font-size**:** 12px**;**

**}**

.content .section**{**

padding**:** 0px**;**

**}**

.content h2**{**

font-size**:** 16px**;**

margin**:** 0px**;**

**}**

.sidebar2**{**

float**:** left**;**

width**:** 262px**;**

min-height**:** 425px**;**

text-align**:** left**;**

background-color**:** #bbd2df**;**

**}**

.sidebar2 .nav**{**

padding**:** 10px 12px**;**

**}**

.sidebarinfo2**{**

width**:** 210px**;**

min-height**:** 150px**;**

text-align**:** left**;**

border**:** 1px solid white**;**

padding**:** 3px**;**

border-radius**:** 10px**;**

background**:** #e6f2ff**;**

**}**

.clearfix**{**

clear**:** both**;**

**}**

.footer**{**

background-color**:** #679BB7**;**

color**:** #ffffff**;**

background**:** url(..**/**images**/**footer\_img.jpg)**;**

padding**:** 10px 0**;**

**}**

.footer p**{**

text-align**:** center**;**

margin**:** 5px**;**

**}**

**11. Update the *UserLogin.html* file, created in Lab 1.**

***c:\xampp\htdocs\SRMLibrary\UserLogin.html***



<!DOCTYPE html>

<html lang**=**"en">

<head>

<meta charset**=**"UTF-8">

<title>SRM University, Online Library Management</title>

<link rel**=**"stylesheet" type**=**"text/css" href**=**"css/MyStyle.css">

</head>

<body topmargin**=**0 >

<div class**=**"container">

<div class**=**"header1">

</div>

<div class**=**"header2">

<img src**=**"images/SRMemblem.jpg">

<br>

<h1>&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;Online Library Management</h1>

</div>

<div class**=**"header3">

</div>

<div class**=**"wrapper">

<div class**=**"sidebar2">

<div class**=**"nav">

<table style**=**"width**:**100%**;**" valign**=**"left" border**=**"0" cellspacing**=**"4" cellpadding**=**"4">

<tr height**=**"7px"></tr>

<tr><td><div class**=**"sidebarinfo2" style**=**"background**:** url(images**/**SRM1.jpg)"></div></td></tr>

<tr height**=**"25px"></tr>

<tr><td><div class**=**"sidebarinfo2" style**=**"background**:** url(images**/**SRM5.jpg)"></div></td></tr>

</table>

</div>

</div>

<div class**=**"content" style**=**"background-color**:** #bbd2ff**;**">

<div class**=**"section">

<br><br>

<h2>SRM Library</h2>

<p>SRM University has an excellent library for the benefit of students, faculties and researchers. As one of the best established libraries according to International Standards, the University Library has a large collection of books covering various branches of Engineering and Technology, Medical and Health Sciences and Science and Humanities and its related fields.</p>

<p>The library is located in the 15-Storey University Administrative Block, and is spread over Ground + 3 floors of 1.50 Lakh sq ft area. The library building is

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<li>Well protected with fire alarms and CCTV security systems</li>

<li>Equipped with reading halls in all the floors, with reference collection</li>

</ul>

</p>

</div>

<form action**=**"CheckUserLogin.php" method**=**"POST">

<table valign**=**"left" border**=**"0" cellspacing**=**"4" cellpadding**=**"4">

<tr><td><b>User Name</b></td><td><input type**=**"text" name**=**"uname"></tr>

<tr><td><b>Password</b></td><td><input type**=**"password" name**=**"pwd"></tr>

<tr><td></td><td><input type**=**"submit" value**=**" Sign in " name**=**"btnnewuser">&nbsp;&nbsp;&nbsp;<a href**=**"NewUser.html">New User Sign up</a></tr>

</table>

</form>

</div>

<div class**=**"sidebar2">

<div class**=**"nav">

<table style**=**"width**:**100%**;**" valign**=**"left" border**=**"0" cellspacing**=**"4" cellpadding**=**"4">

<tr height**=**"7px"></tr>

<tr><td><div class**=**"sidebarinfo2" style**=**"background**:** url(images**/**SRM6.jpg)"></div></td></tr>

<tr height**=**"25px"></tr>

<tr><td><div class**=**"sidebarinfo2" style**=**"background**:** url(images**/**SRM4.jpg)"></div></td></tr>

</table>

</div>

</div>

<div class**=**"clearfix">

</div>

</div>

<div class**=**"footer">

<p> &copy; 2017 Online Library | Developed by M.Anand, Asst. Prof. (Sr. G), Dept. of Information Technology, SRM University</p>

</div>

</div>

</body>

</html>

**12. Update the *NewUser.html* file, created in Lab 1.**

***c:\xampp\htdocs\SRMLibrary\NewUser.html***



<!DOCTYPE html>

<html lang**=**"en">

<head>

<meta charset**=**"UTF-8">

<title>SRM University, Online Library Management</title>

<link rel**=**"stylesheet" type**=**"text/css" href**=**"css/MyStyle.css">

</head>

<body topmargin**=**0 >

<div class**=**"container">

<div class**=**"header1">

</div>

<div class**=**"header2">

<img src**=**"images/SRMemblem.jpg">

<br>

<h1>&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;Online Library Management</h1>

</div>

<div class**=**"header3">

</div>

<div class**=**"wrapper">

<div class**=**"sidebar2">

<div class**=**"nav">

<table style**=**"width**:**100%**;**" valign**=**"left" border**=**"0" cellspacing**=**"4" cellpadding**=**"4">

<tr height**=**"7px"></tr>

<tr><td><div class**=**"sidebarinfo2" style**=**"background**:** url(images**/**SRM1.jpg)"></div></td></tr>

<tr height**=**"25px"></tr>

<tr><td><div class**=**"sidebarinfo2" style**=**"background**:** url(images**/**SRM5.jpg)"></div></td></tr>

</table>

</div>

</div>

<div class**=**"content" style**=**"background-color**:** #bbd2ff**;**">

<div class**=**"section">

<br><br>

<center><h2>Register New User</h2></center>

<form action**=**'SaveNewUser.php' method**=**'POST'>

<table valign**=**"left" border**=**"0" cellspacing**=**"4" cellpadding**=**"4">

<tr><td><b>Register No.</b></td><td><input type**=**"text" name**=**"regno"></td></tr>

<tr><td><b>User Name</b></td><td><input type**=**"text" name**=**"uname"></td></tr>

<tr><td><b>Password</b></td><td><input type**=**"password" name**=**"pwd"></td></tr>

<tr><td><b>Confirm Password</b></td><td><input type**=**"password" name**=**"cpwd"></td></tr>

<tr><td><b>Gender</b></td><td><input type**=**"radio" name**=**"gender" value**=**"Male">Male<input type**=**"radio" name**=**"gender" value**=**"Female">Female</td></tr>

<tr><td><b>Date of Birth</b></td><td><input type**=**"text" name**=**"dd" size**=**"2">/<input type**=**"text" name**=**"mm" size**=**"2">/<input type**=**"text" name**=**"yy" size**=**"4"> dd/mm/yyyy</td></tr>

<tr><td><b>Department</b></td><td><select name**=**"dept"><option>IT</option><option>CSE</option><option>SWE</option><option>ECE</option></td></tr>

<tr><td><b>E-mail Id.</b></td><td><input type**=**"text" name**=**"email"></tr>

<tr><td><b>Mobile No.</b></td><td><input type**=**"text" name**=**"mobile"></tr>

<tr><td></td><td><input type**=**"submit" value**=**" Submit " name**=**"btnsubmit"></td></tr>

</table>

</form>

</div>

</div>

<div class**=**"sidebar2">

<div class**=**"nav">

<table style**=**"width**:**100%**;**" valign**=**"left" border**=**"0" cellspacing**=**"4" cellpadding**=**"4">

<tr height**=**"7px"></tr>

<tr><td><div class**=**"sidebarinfo2" style**=**"background**:** url(images**/**SRM6.jpg)"></div></td></tr>

<tr height**=**"25px"></tr>

<tr><td><div class**=**"sidebarinfo2" style**=**"background**:** url(images**/**SRM4.jpg)"></div></td></tr>

</table>

</div>

</div>

<div class**=**"clearfix">

</div>

</div>

<div class**=**"footer">

<p> &copy; 2017 Online Library | Developed by M.Anand, Asst. Prof. (Sr. G), Dept. of Information Technology, SRM University</p>

</div>

</div>

</body>

</html>

**Home Work:**

**System Analysis phase**

i) Database design: Database Name, Tables, Fields with data type, constraints and size

in a tabular form.

ii) Draw all the web pages of the project and mention all the control names and its

properties.

iii) Draw the data flow diagram of the project.

**Lab 3:**

**3. a) Create a *mysql* database and all the tables of the project in *phpmyadmin*.**

**b) Write a PHP code to store user registration information in the database.**

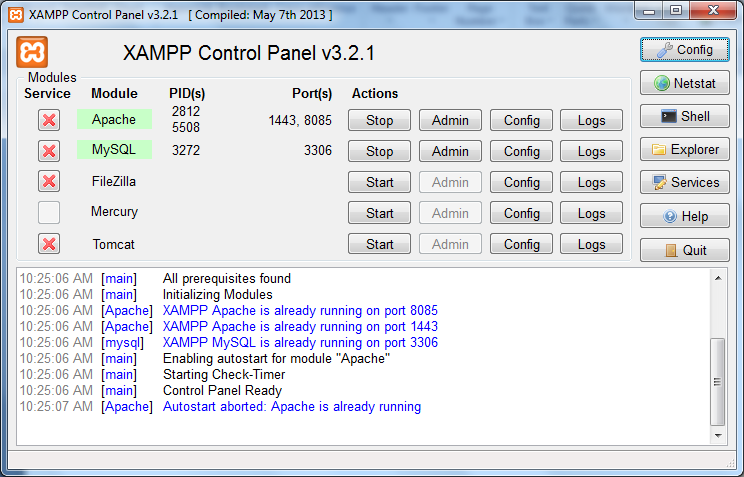
**c) Write a PHP code for user login page.**

**13. Steps to create *mysql* database:**

**Step 1) Open XAMPP Control Panel.**

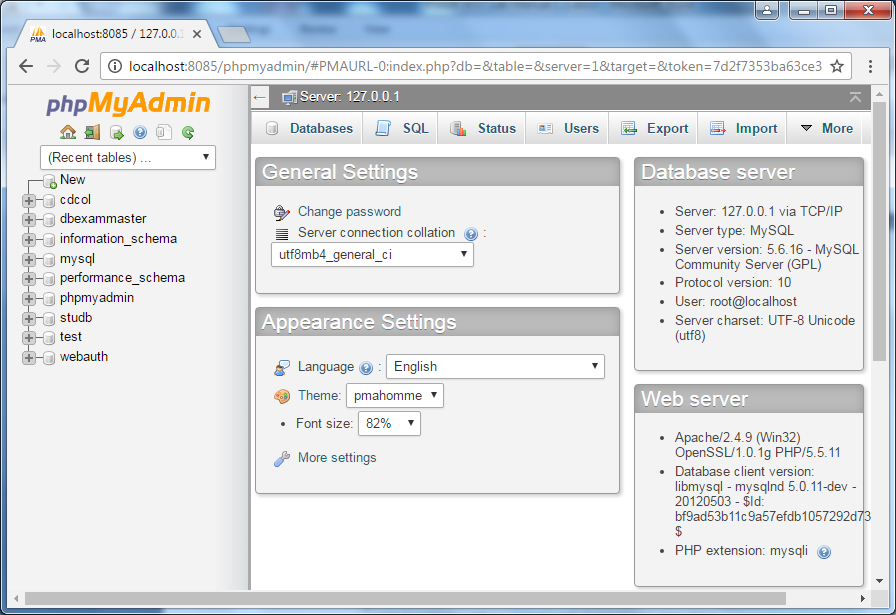
**Step 2) Start the Apache Server module**

**Step 3) Start the MySQL module**

******

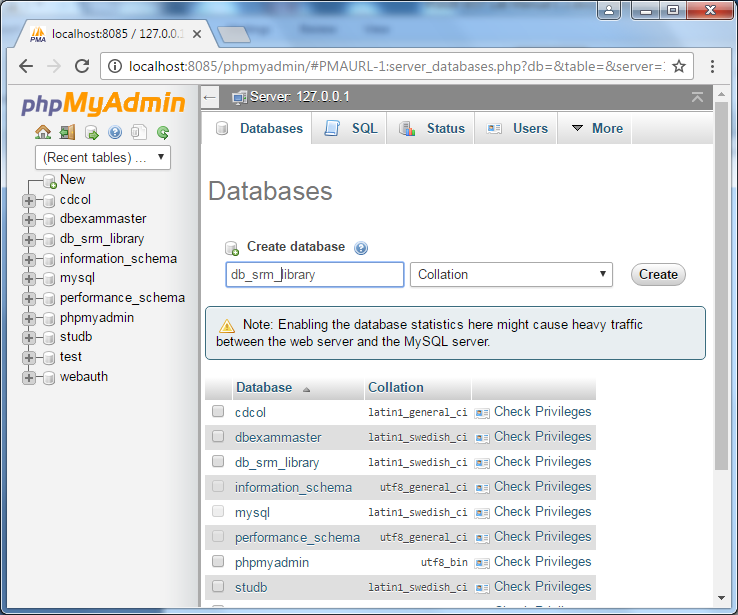
**Step 4) Open web browser and type the url *http://localhost:8085/phpmyadmin***



****

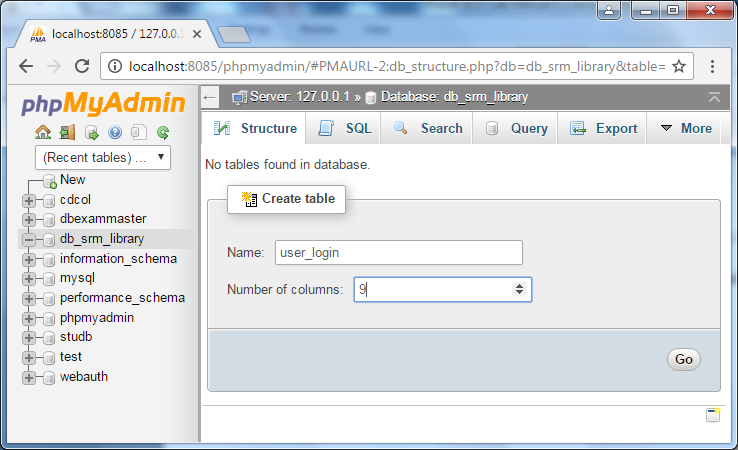
**Step 5) Select *New* to create a new database and enter the database name**

**Eg.: *db\_srm\_library***

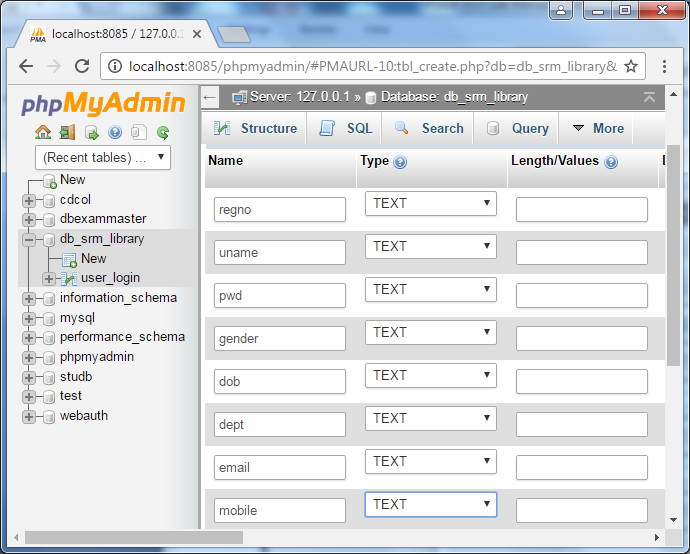
****

**Step 6) Select the database name and enter the table name and number of columns and click on *Go* button**

***Eg.: user\_login***

****

**Step 7) Enter the field names with data type and click on *Save* button**

****

**14) Create a php file, *SaveNewUser.php* in the project folder**

***c:\xampp\htdocs\SRMLibrary\SaveNewUser.php***

<?php

extract($\_POST);

$mysqli = new mysqli('localhost', 'root', 'server', 'db\_srm\_library');

if($mysqli->connect\_errno > 0){

die('Unable to connect to database [' . $db->connect\_error . ']');

}

$dob=$dd.'/'.$mm.'/'.$yy;

$query = "INSERT INTO user\_login VALUES

('$regno','$uname','$pwd','$gender','$dob','$dept','$email','$mobile')";

$insert\_row = $mysqli->query($query);

if($insert\_row){

header("location:RegistrationSuccess.html");

}

else{

die('Error : ('. $mysqli->errno .') '. $mysqli->error);

}

?>

**15) Create a html file, *RegistrationSuccess.html* in the project folder**

***c:\xampp\htdocs\SRMLibrary\RegistrationSuccess.html***



…..

…..

…..

<div class="content" style="background-color: #bbd2ff;">

<div class="section">

<br><br>

<center>

**<h2>New User Successfully Registered!</h2><br><br>**

**<a href="UserLogin.html">Login</a>**

</center>

</div>

</div>

…..

…..

…..

**16) Create a html file, *CheckUserLogin.php* in the project folder**

***c:\xampp\htdocs\SRMLibrary\ CheckUserLogin.php***

<?php

$host="localhost"; // Host name

$username="root"; // Mysql username

$password="server"; // Mysql password

$db\_name="db\_srm\_library"; // Database name

$tbl\_name="user\_login"; // Table name

// Connect to server and select databse.

mysql\_connect("$host", "$username", "$password")or die("cannot connect");

mysql\_select\_db("$db\_name")or die("cannot select DB");

// Define $myusername and $mypassword

$myusername=$\_POST['uname'];

$mypassword=$\_POST['pwd'];

$sql="SELECT \* FROM $tbl\_name WHERE uname='$myusername' and pwd='$mypassword'";

$result=mysql\_query($sql);

// Mysql\_num\_row is counting table row

$count=mysql\_num\_rows($result);

// If result matched $myusername and $mypassword, table row must be 1 row

if($count==1){

// $row=mysql\_fetch\_row($result);

// $sname=$row[0];

// print("<h1>Welcome, $sname!<br></h1>");

// echo "<h2>Login Success!!!</h2>";

header("location:UserMainMenu.php");

}

else {

//echo "<h2>Login Failed!!!</h2>";

header("location:UserLogin.html");

}

?>

**Lab 4:**

**4. a) Create the web pages of the project.**

**b) Design menus and navigation of the project.**

**Lab 5:**

**5. a) Implement business logic of the project.**

**Lab 6:**

**6. a) Validating user inputs of the web pages using Java Script.**

Hint:

* Validate empty field, password field and confirm password field etc.
* Use regular expressions to check ten digit phone number, email format etc.

**Lab 7:**

**7. a) Create a cookie to save the username and password and display it in the respective field when the user returns to the webpage.**

**b) Fetch the user name from the data base and display it in all the web pages of the project through session tracking.**

**Lab 8:**

* **Hosting the web site**
* **Project Documentation submission**
* **Project Demo**

**8. a) Creating user login and registration pages using JSP.**

**b) Creating user login and registration pages using Servlet.**

**Lab 9: Understanding the server AJAX Technology and SOAP based Webservices**

9. a) Make a registration form with username, email, password, phone number and submit it to the database.(include client side and server side validation).Use AJAX to check for username availability in database while user is tying in input field and immediately update the status of user name availability in nearby span field. You can either use PHP or JSP for server side coding

b) Consume a Web service from following Web service providers. The service provider provides Temperature Unit conversion from one unit to other. Develop a client side java program to include the webservice component in its application. The value to be converted is taken from user and call for webservice should be done and result should be displayed back in the application.

**ConvertTemp** - A free Web service that converts temperature values in Celsius, Fahrenheit, Rankine, Reaumur, and Kelvin.

Technical information on the Web service:

* Service Operation Name: ConvertTemp
* Service Provider: WebserviceX.NET
* Service URL: <http://www.webservicex.net/ConvertTemperature.asmx>
* WSDL Document: http://www.webservicex.net/ConvertTemperature.asmx?WSDL
* WSDL version: WSDL 1.1
* SOAP version: SOAP 1.1 and SOAP 1.2
* SOAP message style: Document

Create a SoapUI project called "ConvertTemperature" with WSDL at "http://www.webservicex.net/ConvertTemperature.asmx?WSDL". You will see "ConvertTemp" displayed in the list of operations.

**Lab 10: Understanding xml applied in Document Markup and for Data Exchange.**

* Students should learn the features of xml syntax, DTD, Schema.
* Students should learn XSLT and CSS for document markup presentation.
* Students should learn DOM and SAX parsers for understanding data exchange through java program.

10. a) Make a XML which contains data of a product catalog for computer device specification.

Apply CSS and XSL to enable proper presentation in the browser.

10. b) Create a java program for given XML and DTD to check whether the given XML is well

formed and valid.

10. c) Use DOM parser to fetch the XML content and display in the console through java

program.

10. d) Use SAX parser to fetch the XML content and display in the console through java

program.

Documentation

Abstract

Introduction

System anslysis

Existing System

Proposed System

System Requirement/Specification

Dataflow diagram

Screen shot

Coding

Appendix