A picture containing drawing

Description automatically generatedA close up of a plate

Description automatically generated **Research Article on:**

Comp206 (Heart Rate Scoring)

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**Presented To:**

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**Computer Science Program**

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**Introduction:**

Keeping Monitoring our health become required thing nowadays, cause of what we are passing through of diseases and environmental problems that affects our health, One of the most important things we should be tracking on its rate of change is the heart score rate, As known the pulse of heart is the wave generated in the arteries and veins as result of systole, pulse rate was first measured by ancient Greek physicians and scientists. However, it was not until the invention of the “Physician’s Pulse Watch” in 1707 that changes in pulse rate could be accurately assessed. Stephen Hales (1733) was the first to note that pulse varied with respiration and in 1847 Carl Ludwig was the first to record respiratory sinus arrhythmia. With the measurement of the ECG (1895) and advent of digital signal processing techniques in the 1960s, investigation of HRV “heart rate variability” and its relationship to health and disease has exploded. As chest pain become one of the most common, potentially serious presenting complaints for adult emergency department visits at most of hospitals. And with the appearance of web sites appeared a lot of web applications that help you to keep tracking your health as an “E-doctor” electronic doctor.

**Problem Description:**

While exercising or doing effort you can use a heart rate monitor to watch your heart rate score and see that it stays within a safe range, But here is the question ,  
What is the safe range for my heart scoring rate and when it’s higher or lower than the safe range !!?  
Here comes the role of our web application.

**Specification:**

**Hardware Software**- Server(host) - Internet Connection - Web Browser - Editor/IDE  
- Computer/Laptop/Smart Phone - PHP & MySQL

**Web Application**A scoring system web application that is built in the “AHA” American Heart Association records, that provides you an accurate heart scoring rate analysis depends on the data of your account.

**Stake Holder:  
-** Admin / Statics Analyst - User

**User Interaction & Webpage code explanation:**

**A screen shot of a social media post

Description automatically generated**The journey of the user starts with the main page of the web application and we made sure to make it attractive and simple enough for him, as shown at screen shot.

Once the user opens the main page ,he will find a simple header,  
 brief explanation and fast introduction to the web application as we explained before,   
now he have 2 choices either Registration or login if he already have an account on the system, both are clear at the screen with interactive buttons lighten when mouse cursor moves on.

Now let’s go to the main webpage (heart.html) code explanation.

**heart.html**

|  |
| --- |
| <!Doctype html>  <html>  <head>  <meta charset="utf-8">  <meta name="Heart Score Rate" content="Do you want to know your heart rate score !!?">  <title>Heart Rate Score</title>  <link rel="stylesheet" href="heart.css" >  <!--linked to external style sheet, we prepared to make the page attractive -->  </head>  <body>  <h1>Heart Scoring Rate</h1>  <p><span id="sanaoll"> </span> </p>  <div>  <a href="login.php"><button>Login</button></a>  <a href="register.php"><button>Register</button></a>  <!--on clicking any button, it will redirect you to the meant page-->  </div>  <script type="text/javascript" src="heart.js"></script>  <!--linked to java script file to load the rest of page contents -->  </body>  </html> |

because of style sheets are only for making the web application more coordinated and not required as a main part of the article and it doesn’t affect the work of the web application we will be satisfied attaching images for the used code at the end  
of explaining the required parts (html , Js , php) as mentioned at the project mail.

**heart.js**

|  |
| --- |
| document.getElementById("sanaoll").innerHTML=  "While exercising or doing effort you can use a heart rate monitor, to watch your heart rate score, " +  "And see that it stays within a safe range.<br>" +  "<span class='text2'>But</span> here is the question what is the safe range for my heart rate score <span class='text2'>!!?</span> <br>" +  "Here comes the role of our application '....' : <br>" +  "A Scoring system web application that built in <span class='text2'>American Heart Association 'AHA'</span> records <br>" +  "That provides you an accurate heart rate score depends on the data of your account <br>" +  "Including your <span class='text2'>Max & Target Heart Score Rate</span>. "; |

A screenshot of a cell phone

Description automatically generated  
 Let’s suppose I’m the user and I want to Register at this application for example my name is Elliot, so all I will do is clicking on the registration button at the main page and filling the required data at the form appeared as shown.

A screenshot of a cell phone

Description automatically generatedDon’t worry of leaving any empty input or entering the data in wrong way because there is a warning will appear for you about each mistake, once you correct it all, just hit the Register button and your form will be sent successfully.

Moving to the web page code explanation.

**Register.php**

|  |
| --- |
| <?php include('server.php'); ?>  <!--here we are including php file we considering it as a main server for all processes that needs to access to the data base which we will explain later-->  <!Doctype html>  <html>  <head>  <meta charset="utf-8">  <meta name="Heart Score Rate" content="Do you want to know what your heart rate score means!!?">  <title>Registration</title>  <link rel="stylesheet" href="register.css" > </head>  <body>  <div class="header">  <h2>Register</h2>  </div> <!--the following form will be sent to the server to handle the date -->  <form method="post" action="register.php">  <?php include('errors.php'); ?>  <!--this included php file will validate the errors to appear as shown before  we will explain it later when viewing its code -->  <div class="iputg">  <label>Username</label>  <input type="text" name="username" class="fullin">  </div>  <div class="iputg">  <label>Email</label>  <input type="text" name="email" class="fullin">  </div>  <div class="iputg">  <label>Password</label>  <input type="password" name="password\_1" class="fullin">  </div>  <div class="iputg">  <label>Confirm Password</label>  <input type="password" name="password\_2" class="fullin">  </div>  <div class="iputg">  <label>Birth Date</label><br>  <input type="number" name="day" placeholder="Day" min="1" maxlength="2" max="31" class="halfin">  <input type="number" name="month" placeholder="Month" min="1" maxlength="2" max="12" class="halfin">  <input type="number" name="year" placeholder="Year" min="1900" maxlength="4" max="2020" class="halfin"><br>  </div><div class="iputg">  <button type="submit" name="register" class="btn">Register</button>  </div>  <p> Already member? <a href="login.php">Sign in</a>  </form></div> </body> </html> |

Once you hit the register button the server(server.php) will handle the data as the following code says:

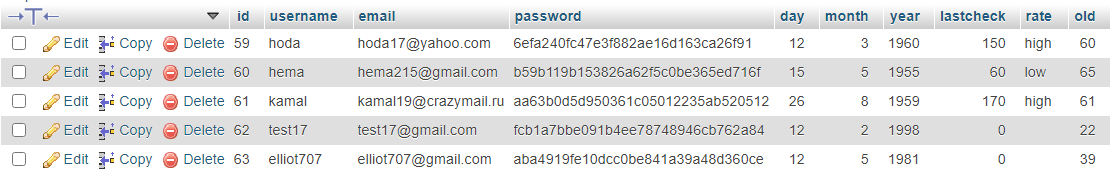
**server.php**

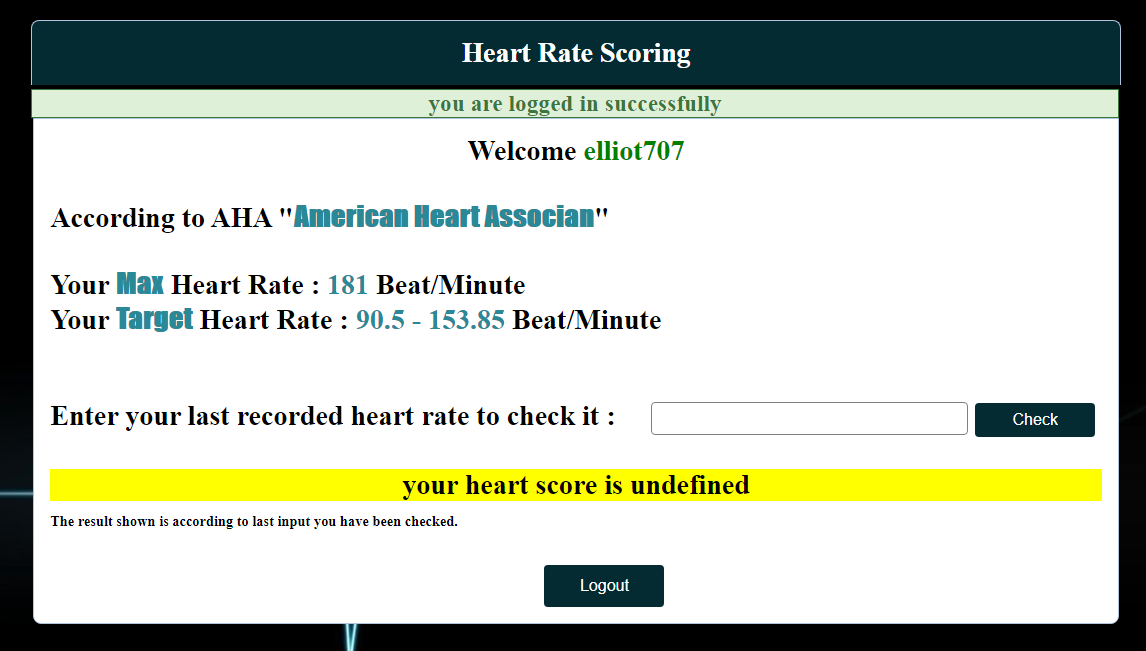
|  |
| --- |
| <?php  {  //error reporting  //defined variables needed along server work  session\_start();  $username="";  $email="";  $day="";  $month="";  $year="";  $lastcheck="";  $rate="";  $old="";  $nresult="";  $lnresult="0";  $hnresult="0";  $nnnresult="0";  $errors=array();  $db = mysqli\_connect('localhost','root','','registration');  // this db variable represent a connection to the data base  if(isset($\_POST['register']))  {  //when the button of registration hit the following happens  $username = mysqli\_real\_escape\_string($db,$\_POST['username']);  $email = mysqli\_real\_escape\_string($db,$\_POST['email']);  $password\_1 = mysqli\_real\_escape\_string($db,$\_POST['password\_1']);  $password\_2 = mysqli\_real\_escape\_string($db,$\_POST['password\_2']);  $day = mysqli\_real\_escape\_string($db,$\_POST['day']);  $month = mysqli\_real\_escape\_string($db,$\_POST['month']);  $year = mysqli\_real\_escape\_string($db,$\_POST['year']);  // the entered data saved at the variables and now time to check it  if(empty($username))  {  array\_push($errors,"User name is required");  }  if(empty($email))  {  array\_push($errors,"Email is required");  }  if(empty($password\_1))  { array\_push($errors,"Password is required");  }  if(empty($day))  {  array\_push($errors,"day of birth required");  }  if(empty($month))  {  array\_push($errors,"month of birth is required");  }  if(empty($year))  {  array\_push($errors,"year of birth is required");  }  if($password\_1 != $password\_2)  {  array\_push($errors,"The password don't match ");  }    /\*if any input is empty warning message will be saved into the array  of errors and it will appear to the user without registering\*/   /\*if the array of errors is empty then entered values will be   saved into the data base as following\*/  if (count($errors) == 0)  {  $old = 2020 - $year; $password=md5($password\_1);  //we encrypt the password before saving for security reasons  $sql="INSERT INTO users (username,email,password,day,month,year,old) values ('$username','$email','$password',$day,$month,$year,$old)";  mysqli\_query($db,$sql);  //now the data saved into the data base by the previous query  $\_SESSION['username'] = $username;  $\_SESSION['success'] = "you are logged in successfully";  /\*saved the username into session variable as cookie  to stay logged in if its value didn’t changed\*/  header('location: index.php');  //redirecting into the home page of the user after registered  }  /\*there is continuous for the server’s code, but we will explain each   part at its suitable time\*/  }  ?> |

In case the errors array wasn’t empty the following happen.  
  
**errors.php**

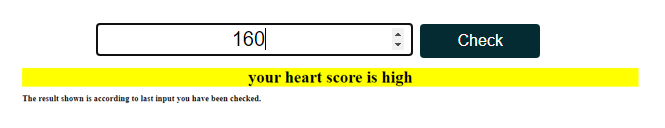
|  |
| --- |
| <?php if(count($errors) > 0): ?>  <div class="error">  <?php foreach ($errors as $error): ?>  <p><?php echo $error; ?></p>  <?php endforeach ?>  </div>  <?php endif ?> |

Its main idea is a foreach loop that views the saved elements at the errors array.

After registering and everything works ok our data will be saved at the database as shown, at the last row,

Now I’m Elliot again, after clicked the register button there is session created with my name and it redirects me to my home page (index.php),  
which shown at following screenshot.  
  
The application welcoming me and there is some information about me, my max & target heart rate, and there is input to fill with last recorded heart rate score I got, either using the heart watch or however the method.

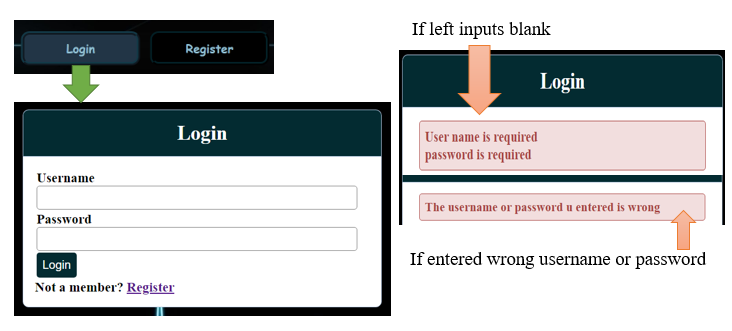
Once I enter the reading and click on check button the undefined value at the yellow line changes into my heart rate condition (low/normal/high) depends.

now I found out that my heart rate score is higher than normal, so I need to rest and call my doctor to help with that, after getting the information I wanted to know I logout of the web application clicking on the logout button lower of the page and it redirect me to the main page (heart.html), I relog in when I want to check my heart rate again.  
Now let’s go behind the code and see how all that done.  
**Index.php**

|  |
| --- |
| <?php include('server.php'); ?>  <!Doctype html>  <html>  <head>  <meta charset="utf-8">  <meta name="Heart Score Rate" content="welcome user ">  <title>Heart Rate Score</title>  <link rel="stylesheet" href="index2.css" > </head>  <body>  <div class="header"> <h2>Heart Rate Scoring</h2> </div>  <div class="content"> </div>  <div class="heartcalc">  <?php if (isset($\_SESSION['success'])): ?>  <div class="success"> <h3> <?php  echo $\_SESSION['success'];  unset($\_SESSION['success']); ?></h3></div>  <?php endif ?>    <div class="test2"><font color="black">  <p align="center">Welcome <strong><span style="color:green;">  <?php echo $\_SESSION['username']; ?></span></strong></p><br>    <p> According to AHA "<span class="text3">American Heart   Associan</span>"<br><br>  <?php  //Heart Rate Calculator  $username=$\_SESSION['username'];  $oldquery ="SELECT old FROM users WHERE username='$username'";  $result = mysqli\_query($db, $oldquery);   /\*this query for getting the old of the user from data base and use it to calculate max and target heart rate as following\*/  while ($row = $result->fetch\_assoc()) {  $userold = $row['old']."<br>";  }  $oldy = (int)$userold;  echo 'Your <span class="text3">Max</span> Heart Rate :  <span class="text4"> '. (220 - $oldy) . "</span> Beat/Minute<br>";  echo 'Your <span class="text3">Target</span> Heart Rate :   <span class="text4"> ' . ((50/100)\*(220 - $oldy)) . " - " .   ((85/100)\*(220 - $oldy)) . "</span> Beat/Minute<br><br>";  ?><br>  <form method="post" action="index.php">  <label>Enter your last recorded heart rate to check it :</label> &nbsp;&nbsp;&nbsp;  <input type="number" name="lastcheck" class="halfin" id="lastcheck">  <button name="check1" class="btnin" type="submit">Check</button>  <!--when you click the button the server handle the value of input as next-->  </form><br>  <?php  //the following step to save the remaining values at the data base rate &lastcheck  echo '<p id="show" class="checkv">';  $inputvalue=""; //to get the input value of last heart rate  $rater="undefined"; //to save the condition of this value  if(isset($\_POST['check1']))  {  $db = mysqli\_connect('localhost','root','','registration');  $inputvalue = mysqli\_real\_escape\_string($db,$\_POST['lastcheck']);  //now the value we entered saved at the variable  if($inputvalue < ((50/100)\*(220 - $oldy))) { $rater="low"; }  else if($inputvalue > ((85/100)\*(220 - $oldy))) {$rater="high"; }  else { $rater="normal";}  $sql = "UPDATE users SET lastcheck = '$inputvalue' WHERE   username='$username'";  mysqli\_query($db,$sql);  $sql = "UPDATE users SET rate = '$rater' WHERE   username='$username'";  mysqli\_query($db,$sql);  }  //now the variables value saved at the data base  echo ' your heart score is ' . $rater . '</p>';  echo '<font size="4">The result shown is according to last input you have been checked.</font><br>'; /\*that’s the yellow line after replacing the undefined value with another depends on your heart rate score\*/  ?>  <br>  <p><button class="btn">  <a href="index.php?logout='1'">Logout</a></button>  <!-- this is the logout button we will see how it works next -->  </p></font>  </div>  </div>  </div>  </body>  </html> |

**server.php (“cont.”)**

|  |
| --- |
| <?php  //logout  if (isset($\_GET['logout']))  {  session\_destroy(); unset($\_SESSION['username']);  header('location: heart.html');  }  /\*by clicking logout, the session destroy itself by undefining the username variable which was working as cookie to keep the user login and redirecting to the main page\*/ ?> |

Now all data is recorded into the data base as shown,  
next time I need the application I will hit the login button from the main page.  
and it will redirect me to the login form, this time I need to enter only the username and password I registered with, and it’s won’t allow me to enter my home page   
till I write both correctly.

let’s see how the login page code looks like,  
**login.php**

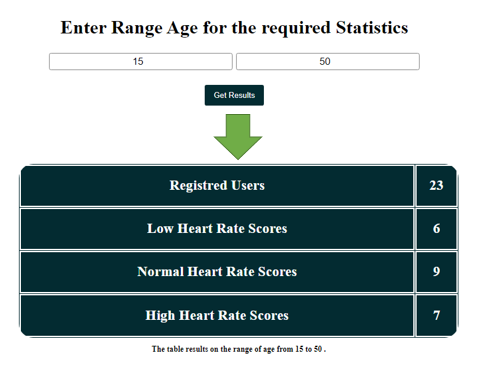
|  |
| --- |
| <?php include('server.php'); ?> <!—we include the server because we need it to check the input values-->  <!Doctype html>  <html>  <head>  <meta charset="utf-8">  <meta name="Heart Score Rate" content="this is the login page ">  <title>Login</title>  <link rel="stylesheet" href="register.css" > </head>  <body>  <div class="header">  <h2>Login</h2>  </div>  <form method="post" action="login.php">  <?php include('errors.php'); ?>  <div class="iputg">  <label>Username</label>  <input type="text" name="username" class="fullin">  </div>  <div class="iputg">  <label>Password</label>  <input type="password" name="password" class="fullin">  </div>  <div class="iputg">  <button type="submit" name="login" class="btn">Login</button>  <!--when you click the button the server check the data entered-->  </div>  <p>Not a member? <a href="register.php">Register</a></p>  </form>  </div>  </body>  </html> |

**server.php(“cont.”)**

|  |
| --- |
| <?php  //User login check  if(isset($\_POST['login'])) //on clicking the login button  {  $username = mysqli\_real\_escape\_string($db,$\_POST['username']);  $password = mysqli\_real\_escape\_string($db,$\_POST['password']);  if(empty($username))  { array\_push($errors,"User name is required"); }  if(empty($password))  { array\_push($errors,"password is required"); }  /\*if any of the inputs was empty a warning message will be   recorded into the errors array and the process as the registration page\*/  if(count($errors) == 0){//if there is no empty inputs continue  $password = md5($password);  $query ="SELECT \* FROM users WHERE username='$username'   AND password='$password'";  $result = mysqli\_query($db, $query);  /\*we encrypt the password before checking it with the username cause it’s   recorded encrypted \*/  if (mysqli\_num\_rows($result) == 1)  {  /\*now we check the login type depending on the username logging as   admin will redirect to different page than normal users\*/  if($username =="admin")  {   $\_SESSION['username'] = $username;   $\_SESSION['success'] = "you are logged in successfully"; header('location: admin.php');// admin redirection page  }else{   $\_SESSION['username'] = $username;   $\_SESSION['success'] = "you are logged in successfully";  header('location: index.php'); //normal user redirection  }  }else{   array\_push($errors,"The username or password u entered is wrong ");  }//if both wrong show warning error message  }} ?> |

A screenshot of a cell phone

Description automatically generated**Admin/Statistics Analyst Interaction & Webpage code explanation:**The admin or statics analyst will login normal as user did, but the redirection web page will be different. “there is ready made account for him”  
when the admin login the following page appears.  
  
The admin now connected indirectly to the data base all he needs to do is entering age range for the required statistics and clicks get results then the table shows him,  
number of all registered people within this range, number of people with diseases whose heart rate is not normal,  
 and also it specifies how many users there with high or low heart rate.  
It also mention number of healthy people who have normal heart rate within the age range you specified.

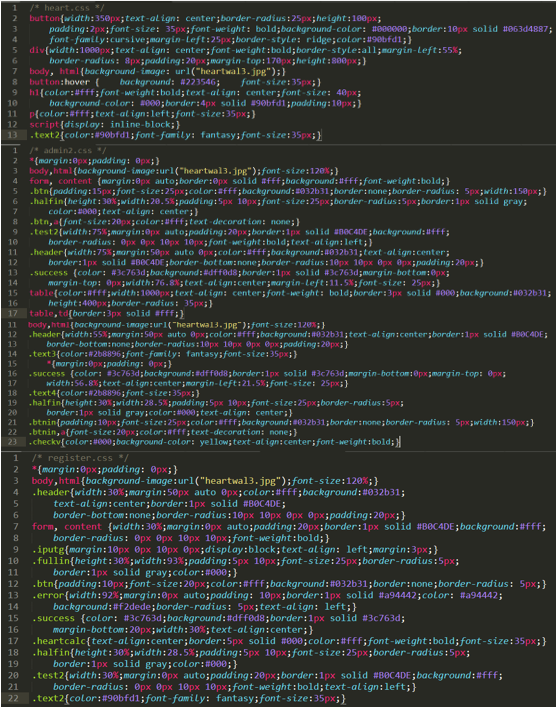
The statistics page code.  
  
**admin.php**

|  |
| --- |
| <?php include('server.php'); ?>  <!Doctype html>  <html>  <head>  <meta charset="utf-8">  <meta name="Heart Score Rate" content="admin page">  <title>Statistics</title>  <link rel="stylesheet" href="admin2.css" > </head>  <body>  <div class="header"><h2>Statistics Heart Scoring Rates</h2></div>  <div class="content"></div><div class="heartcalc">  <?php if (isset($\_SESSION['success'])): ?>  <div class="success">  <h3><?php  echo $\_SESSION['success'];  unset($\_SESSION['success']);  ?></h3></div><?php endif ?>  <div class="test2"><font size="6" color="black" align="center">  <p align="center">Welcome <strong><span style="color:green;">  <?php echo $\_SESSION['username']; ?>  </span></strong></p><br><br>  <form method="POST" action="admin.php">  <div align="center">  <label><b><font size="7">Enter Range Age for the required Statistics   </font></b></label><br><br>  <input type="number" name="minv" class="halfin" placeholder="Starting Age">  <input type="number" name="maxv" class="halfin" placeholder="Ending Age">   <br><br>  <button type="submit" class="btn" name="gresult">Get Results</button>   <br><br></form><table>  <tr>  <td>Registered Users</td>  <td><?php echo $nresult; ?></td>  </tr>  <tr>  <td>Low Heart Rate Scores</td>  <td><?php echo $lnresult; ?></td>  </tr>  <tr>  <td>Normal Heart Rate Scores</td>  <td><?php echo $nnnresult; ?></td>  </tr>  <tr>  <td>High Heart Rate Scores</td>  <td><?php echo $hnresult; ?></td>  </tr>  </table><?php  echo'<font size="4" color="black" >The table results on the range of age from ' .   $minv . ' to ' . $maxv . ' .</font>'; ?></div><br>  <p><button class="btn"><a href="index.php?logout='1'">Logout</a></button></p>  </p></font></div>  </div></div>  </div><!--the admin page code is clear but how the statistics come that’s the   rule of the server again we explain it next -->  </body>  </html> |

**Server.php(“cont.”)**

|  |
| --- |
| <?php   $minv="0";  $maxv="0";  if(isset($\_POST['gresult'])) //now we saved the input values  {  $db = mysqli\_connect('localhost','root','','registration');  $minv = mysqli\_real\_escape\_string($db,$\_POST['minv']);  $maxv = mysqli\_real\_escape\_string($db,$\_POST['maxv']);  $userquery ="SELECT username FROM users WHERE old >='$minv'   and old<='$maxv'";  $result = mysqli\_query($db, $userquery);  $nresult = mysqli\_num\_rows($result);  $highquery ="SELECT username FROM users WHERE   old >='$minv' and old<='$maxv' and rate='high'";  $hresult = mysqli\_query($db, $highquery);  $hnresult = mysqli\_num\_rows($hresult);  $normalquery ="SELECT username FROM users WHERE   old >='$minv' and old<='$maxv' and rate='normal'";  $nnresult = mysqli\_query($db, $normalquery);  $nnnresult = mysqli\_num\_rows($nnresult);  $lowquery ="SELECT username FROM users WHERE  old >='$minv' and old<='$maxv' and rate='low'";  $lresult = mysqli\_query($db, $lowquery);  $lnresult = mysqli\_num\_rows($lresult);  }//and that’s how the query of the statistics are.  ?> |

Now the admin got the statistics he wanted and after finishing he logs out as user do without any problems.

**Style Sheets**  
as mentioned before it’s not required thing at the article to explain how CSS code works according to the project mail, so we will be satisfied only adding screenshots ****for the code.

**Conclusion:**

At this article we discussed how to keep track on our heart scoring rate, after getting the value of this score rate, we use this web application to check the meaning of the numeric value you got, by logging in or registering if you are using the application for the first time.  
 the application uses the captured data to present you an accurate values for your:  
max & target heart rate score according to AHA.  
heart rate score condition (high, normal, low) according to your data.  
If you are the admin of this application, you will be able to see important statistics   
about the health condition for all registered users,   
for statistics scientists such data and statistics are very valuable at making medical statistics.   
Also at this article, we explained all the following processes:  
how does the code works and how to interactive with the web application as a user and as an admin showing all that with screenshots, and how the server uses the data we give and store it in the data base and bring back results we are awaiting for using MySQL queries.

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