CS 458
Software Verification and Validation
2018-2019 Summer
Homework #1
Introduction to Test Automation (Web)

Grup Şurup

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1. Implement the web login page of Stars systems of Bilkent University, which asks for user ID and password and decides either login or give an error message. Attach your code and UML diagrams.

- **DATABASE:**

```
package database;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;

public class Main {
   public static void main(String[] args) throws Exception
   {
      dropUserTable();

      createUserTable();
      int j =0;
      int k;
      int student_id;
      String temp_password = "";
      for (k = 0; k < 100; k++){
         student_id = 20000000+j;
         temp_password = "halilaltayguvenir";
         insertUser(student_id, temp_password);
         j++;
      }
   }



   public static void dropUserTable()
         throws Exception
   {
      try
      {
         Connection con = getConnection();
         PreparedStatement posted = con.prepareStatement("DROP TABLE User");
         posted.executeUpdate();
      }
      catch (Exception e) {System.out.println(e);}
      finally
      {
         System.out.println("Drop complete");
      }
   }
```

```
    public static void insertUser(int sid, String password)
            throws Exception
    {
        try
        {
            Connection con = getConnection();
            PreparedStatement posted = con.prepareStatement("INSERT INTO User"
                    + "(sid, password)"
                    + "VALUES ('" + sid + "', '" + password + "' )");
            posted.executeUpdate();
        }
        catch (Exception e) {System.out.println(e);}
        finally
        {
            System.out.println("Insert complete");
        }
    }

    public static void createUserTable()
    {
        try
        {
            Connection connection = getConnection();
            PreparedStatement userT = connection.prepareStatement("CREATE TABLE IF NOT
EXISTS User( "
                    + "sid INT(8), password VARCHAR(64),"
                    + "PRIMARY KEY (sid) )"
                    + "Engine=InnoDB");
            userT.executeUpdate();
        }
        catch (Exception e) {System.out.print(e);}
        finally{System.out.println("Table created");}
    }

    public static Connection getConnection() throws Exception
    {
        try
        {
            String driver = "com.mysql.jdbc.Driver";
            String url = "jdbc:mysql://dijkstra.ug.bcc.bilkent.edu.tr/begum_tascioglu";
            String username = "begum.tascioglu";
            String password = "3Y2HxbNq";

            Class.forName(driver);
            Connection con = DriverManager.getConnection(url, username, password);
            System.out.println("Connected");

            return con;

        }catch(Exception e) {System.out.print(e);}

        return null;
    }

}
```

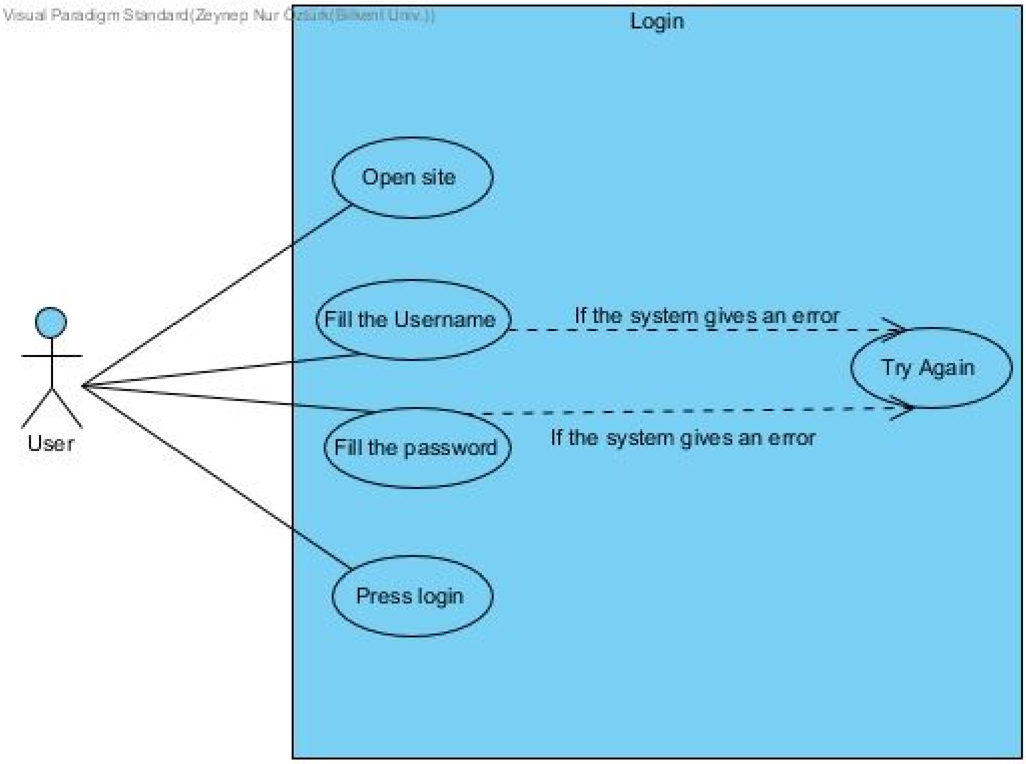
- **LOGIN PAGE (PHP):**

```
<html>
<body>
<?php

/*
Connection is established on dijkstra server by using the MariaDB (dijkstra
id:begum.tascioglu password:myepoulrv)
MariaDB account information is also used in php code to connect database
*/
    session_start();
    $connection = mysqli_connect('dijkstra.ug.bcc.bilkent.edu.tr', 'begum.tascioglu',
'3Y2HxbNq', 'begum_tascioglu');
    $_SESSION['apply']= "false";
    if(! $connection)
    {
        die('Connection Error!!! ' . mysqli_error());
    }

$_SESSION['acctype']="Invalid";


if (isset($_POST["login"])){
    $sid = $_POST['sid'];
    $password = $_POST['password'];
    $i = 0;
    $intcheck =0;
    for($i = 0; $i < strlen($sid); $i++){
      if(ord($sid[$i]) >57 || ord($sid[$i]) <48){ //ASCII code is used to detect if the ID is integer
or not
        $intcheck = 1;
        $message = "ID should be integer";
        echo "<script type='text/javascript'>alert('$message'); </script>";
        break;
      }
```

```
   }
            if ($_POST['sid']> 19999999 && $_POST['sid']< 199999999 &&
$_POST["password"]!=""){ //Student IDs are between > 19999999 and < 199999999
                    $query="SELECT * FROM User WHERE sid='$sid' AND password =
'$password';";

      $result = $connection-> query($query);
      if($result -> num_rows == 1) //trial for succesful login
      {
         $message = "Successfully logged in";
         echo "<script type='text/javascript'>alert('$message'); </script>";
      }
      $maxcheck = 0;
      if (strlen($password) > 64) //trial for too long password
      {
        $maxcheck =1;
        $message = "Password is too long (max 64 characters)";
        echo "<script type='text/javascript'>alert('$message'); </script>";
      }

      $mincheck = 0;
      if (strlen($password) < 7) //trial for too short password
      {
        $mincheck =1;
        $message = "Password is too short (max 6 characters)";
        echo "<script type='text/javascript'>alert('$message'); </script>";
      }

      $wrong_password="SELECT * FROM User WHERE sid = '$sid' AND password !=
'$password' ";
      $wrong_password_result = $connection-> query($wrong_password);
      //trial for wrong password
      if( ($intcheck ==0 && $maxcheck ==0 && $mincheck ==0 )&& $result -> num_rows ==
0 && $wrong_password_result -> num_rows ==1)
      {
         $message = "Wrong Password";
         echo "<script type='text/javascript'>alert('$message'); </script>";
      }
         }
         else if ($_POST['sid']== ""){ //trial for empty ID
                  $message="ID cannot be empty";
   echo "<script type='text/javascript'>alert('$message'); </script>";
  }
         else if ($_POST["password"]==""){  //trial for empty password
                  $message="Password required";
   echo "<script type='text/javascript'>alert('$message'); </script>";
```

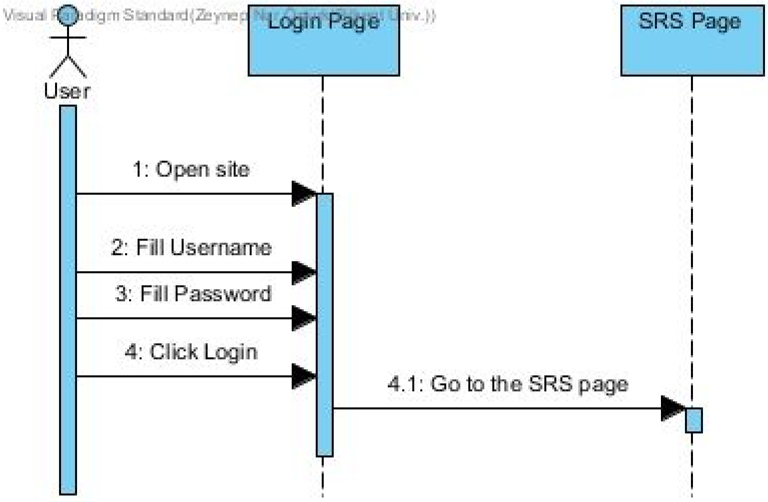
```
	}
 else{
  if ($intcheck ==0 && strlen($password)<=64 && strlen($password)>=6){ //for any omitted
cases
   $message="Cannot logged in";
  echo "<script type='text/javascript'>alert('$message'); </script>";
 }
 }
}

if (isset($_POST['register'])){
	$host  = $_SERVER['HTTP_HOST'];
	$uri  = rtrim(dirname($_SERVER['PHP_SELF']), '/\\');
	$extra = 'registercreator.php';
	header("Location: http://$host$uri/$extra");
}

?>

<form action="" method="POST" enctype="multipart/form-data">
<br>
ID: <input type="text" name="sid" value="">
<br>
Password: <input type="password" name="password">
<br>
<input type="submit" name="login" value="Sign in">
</form>

</body>
</html>
```

1. Use Case Diagram for Login Page


Visual Paradigm Standard(Zeynep Nur Ozturk(Bilkent Univ.))
Login
Open site
Fill the Username
If the system gives an error
Try Again
Fill the password
If the system gives an error
Press login
User

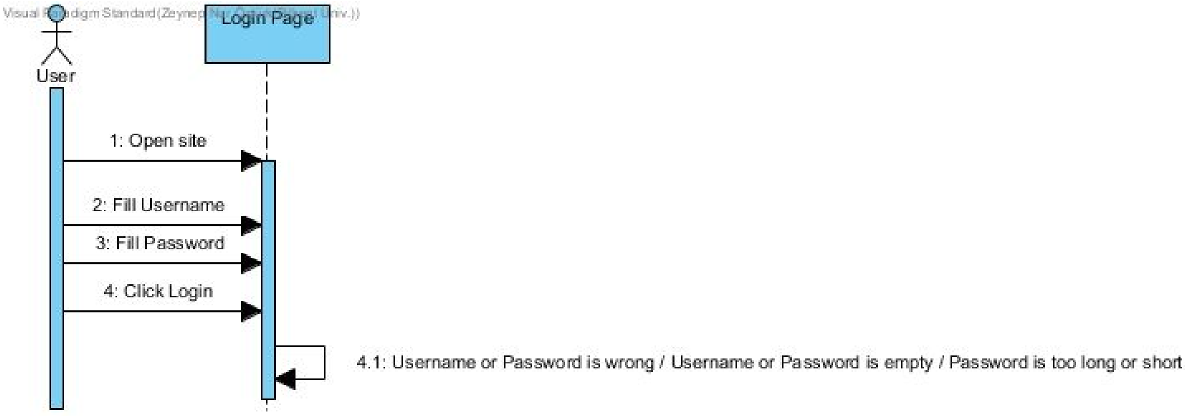
In SRS based login page, user has capabilities like open the site fill the username and password part and press the login. If the system gives an error based on the username and password user need to try again.

2. Sequence Diagram for Correct Usage



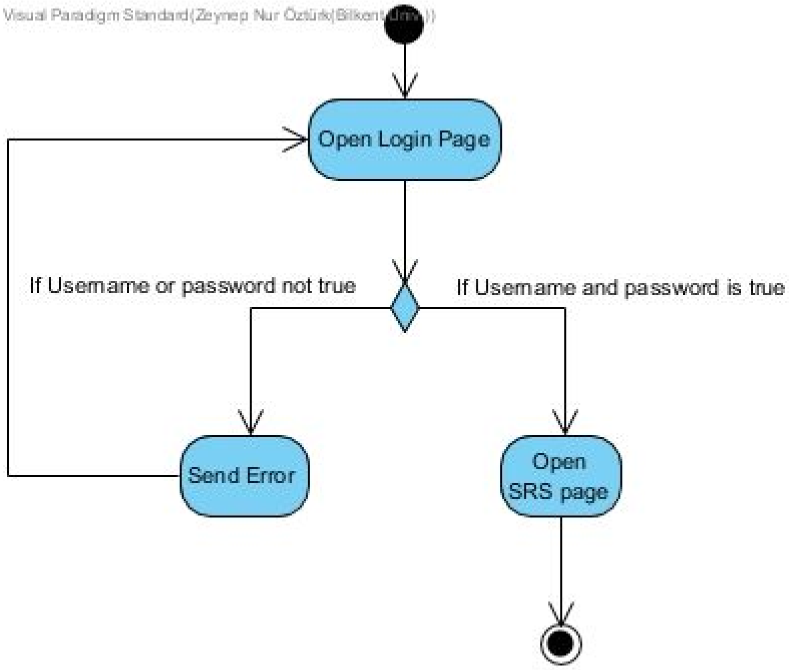
In this diagram user first opens the site and fill the username and password part then click the login button. Because this diagram represents the correct usage login page is directed to SRS page.

3. Sequence Diagram for Wrong Usage


Visual Paradigm Standard(Zeynep Nur Öztürk(Bilkent Univ.))
Login Page
User
1: Open site
2: Fill Username
3: Fill Password
4: Click Login
4.1: Username or Password is wrong / Username or Password is empty / Password is too long or short

User opens the site enters a username or password which is not correct or empty or out of boundaries, then login page gives an error and return to its original state.

4. Activity Diagram


Visual Paradigm Standard(Zeynep Nur Öztürk(Bilkent Univ.))
Open Login Page
If Username or password not true
If Username and password is true
Send Error
Open SRS page

The system opens the login page as a start. Then it decides if the username or password is true or not. If it is true system starts the SRS page else it sends an error and opens the login page again.

2. Examine Selenium which automates browsers. List main 10 capabilities.

Selenium is a highly helpful tool for the engineers who doesn't like testing the cases one by one. It has good features like:

1. Selenium WebDriver supports many languages that include Java, Python, Ruby, C#, JavaScript, Perl and PHP.
2. It supports different browsers like firefox, chrome, opera, explorer etc.
3. It supports different operating systems like Android, iOS, Windows, Linux, Mac, Solaris.
4. It also supports parallel test execution and this reduces time and increases the efficiency of tests.
5. Selenium offers a user friendly interface which means functions with basic names that enables all kinds of users to use such as By.name() to find an element of the html code to select a variable for selenium to use by its "name" value in html code.
6. findElement() method to use with driver (in our case, we used chrome driver) to find element(like button names) in HTML code and direct it to the web driver.
7. sendKeys(), we used it for sending the sample inputs to our test cases.
8. System.setProperty() to set webdriver which is desired such as (firefox, chrome, opera etc.).
9. In test case, driver.findElement(By.name("login")).**click()** to click the button which is specified by findElement(By.name())
10. For an instance of read-write capability, **databaseEnabled** key is used for whether the session can interact with database storage.

3. Write 5 test cases for your login page.

1. Wrong Credentials: We implement test case for wrong username
2. Length of Password: We implement test case for too long or too short password entries
3. Empty Credentials: We implement test case for empty username & password
4. String ID: We implement test case for a login attempt with ascii characters in username section
5. Correct case: We implement test case for a correct username & password combination

4. Write test automation code for 5 test cases using Selenium for your login page. Attach your code.

1. **Wrong Credentials**

```
package cs458;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

public class login {
        public static void main(String[] args) throws InterruptedException {
                System.setProperty("webdriver.chrome.driver",
"C:\\Users\\saidd\\OneDrive\\Desktop\\chromedriver.exe");
                WebDriver driver = new ChromeDriver();
                driver.get("http://localhost/cs458/login.php");
                Thread.sleep(1000);
                WebElement searchBox;
                searchBox = driver.findElement(By.name("sid"));
                searchBox.sendKeys("beta");
                Thread.sleep(1000);
                WebElement searchBox1;
                searchBox1 = driver.findElement(By.name("password"));
                searchBox1.sendKeys("halilaltayguvenir");
                Thread.sleep(1000);
                driver.findElement(By.name("login")).click();
                Thread.sleep(5000);
                searchBox = driver.findElement(By.name("sid"));
                searchBox.sendKeys("20000000");
                Thread.sleep(1000);
                searchBox1 = driver.findElement(By.name("password"));
                searchBox1.sendKeys("data");
                Thread.sleep(1000);
                driver.findElement(By.name("login")).click();
                Thread.sleep(5000);
                driver.quit();
        }
}
```

2. **Length of Password**

```
package cs458;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

public class login {
	public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.chrome.driver",
"C:\\Users\\saidd\\OneDrive\\Desktop\\chromedriver.exe");
		WebDriver driver = new ChromeDriver();
		driver.get("http://localhost/cs458/login.php");
		Thread.sleep(1000);
		WebElement searchBox;
		WebElement searchBox1;

		searchBox = driver.findElement(By.name("sid"));
		searchBox.sendKeys("20000000");
		Thread.sleep(1000);
		searchBox1 = driver.findElement(By.name("password"));

searchBox1.sendKeys("hshhdhhshhshahshxnnshshhshsahhsahahshahshhshshshns
hshshahahhjsjsddhdh");
		Thread.sleep(1000);
		driver.findElement(By.name("login")).click();
		Thread.sleep(5000);

		searchBox = driver.findElement(By.name("sid"));
		searchBox.sendKeys("20000000");
		Thread.sleep(1000);
		searchBox1 = driver.findElement(By.name("password"));
		searchBox1.sendKeys("hh");
		Thread.sleep(1000);
		driver.findElement(By.name("login")).click();
		Thread.sleep(5000);

		driver.quit();
	}
}
```

3. Empty Credentials

```
package cs458;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

public class login {
        public static void main(String[] args) throws InterruptedException {
                System.setProperty("webdriver.chrome.driver",
"C:\\Users\\saidd\\OneDrive\\Desktop\\chromedriver.exe");
                WebDriver driver = new ChromeDriver();
                driver.get("http://localhost/cs458/login.php");
                Thread.sleep(1000);
                WebElement searchBox;
                WebElement searchBox1;

                searchBox = driver.findElement(By.name("sid"));
                searchBox.sendKeys("");
                Thread.sleep(1000);
                searchBox1 = driver.findElement(By.name("password"));
                searchBox1.sendKeys("halilaltayguvenir");
                Thread.sleep(1000);
                driver.findElement(By.name("login")).click();
                Thread.sleep(5000);

                searchBox = driver.findElement(By.name("sid"));
                searchBox.sendKeys("20000000");
                Thread.sleep(1000);
                searchBox1 = driver.findElement(By.name("password"));
                searchBox1.sendKeys("");
                Thread.sleep(1000);
                driver.findElement(By.name("login")).click();
                Thread.sleep(5000);

                driver.quit();
        }
}
```

4. String ID

```
package cs458;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

public class login {
        public static void main(String[] args) throws InterruptedException {
                System.setProperty("webdriver.chrome.driver",
"C:\\Users\\saidd\\OneDrive\\Desktop\\chromedriver.exe");
                WebDriver driver = new ChromeDriver();
                driver.get("http://localhost/cs458/login.php");
                Thread.sleep(1000);
                WebElement searchBox;
                WebElement searchBox1;

                searchBox = driver.findElement(By.name("sid"));
                searchBox.sendKeys("sadasddas");
                Thread.sleep(1000);
                searchBox1 = driver.findElement(By.name("password"));
                searchBox1.sendKeys("halilaltayguvenir");
                Thread.sleep(1000);
                driver.findElement(By.name("login")).click();
                Thread.sleep(5000);
                driver.quit();
        }
}
```

5. Correct Case

```
package cs458;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

public class login {
        public static void main(String[] args) throws InterruptedException {
```

```
        System.setProperty("webdriver.chrome.driver",
"C:\\Users\\saidd\\OneDrive\\Desktop\\chromedriver.exe");
        WebDriver driver = new ChromeDriver();
        driver.get("http://localhost/cs458/login.php");
        Thread.sleep(1000);
        WebElement searchBox;
        WebElement searchBox1;

        searchBox = driver.findElement(By.name("sid"));
        searchBox.sendKeys("20000000");
        Thread.sleep(1000);
        searchBox1 = driver.findElement(By.name("password"));
        searchBox1.sendKeys("halilaltayguvenir");
        Thread.sleep(1000);
        driver.findElement(By.name("login")).click();
        Thread.sleep(5000);
        driver.quit();
    }
}
```

5. Evaluate your automation experience.

Even though we’ve never do anything like this before in our previous projects, the Selenium tool helped us so much thanks to its usability. Like it’s been said, even though we’ve never used such tool before or never made any automation, we’ve found that using selenium was really easy and effective. It really is a brilliant tool which makes testing easy with its functions like .findElement, .sendKeys, click and many more. Even if someone with a little technical background can understand the behaviour of these functions and can make use of these. Also we didn’t need much time to learn about its functions as well since they are written is such a basic english language and there are so many online tutorials of Selenium.

We found that writing code for automation was actually pretty fun and gives us a feeling that we are actually doing something unlike writing document or making a manual testing because it required less labor work and more of a thinking process. We really were shocked when we ran the code successfully for the first time and saw that it opened a web browser and go to a web site since we’ve never do such thing. We really liked writing an automation test and we are really looking forward to the next homeworks where our teacher told us that we’re really gonna write more automation codes

6. Explain how test automation contributes to software development life cycle in terms of velocity and quality.

In the perspective of overall automation, one can claim that this is the best part of testing process since it requires least manual work, instead it requires logic and algorithm. Most people wouldn’t think that testing requires much of an algorithm skill or even coding itself and that’s why computer scientist/engineers hesitates to become a test engineer but automation really breaks the conventional ways and prejudices of people who are doubtful about becoming a test engineer. It can be said that, doing something is one thing, teaching computer how to do that thing is another thing which is charming and brilliant since computer can do things that humans cannot do as efficient and as quick as the computer. It saves us from unnecessary labor and helps us to spend our time more efficient.

If we’d have to give an example, let’s think about a huge project like one of HAVELSAN’s projects which has loads and loads of requirements. When we find a mistake in the system and developers took care of it, we have to run the regression test which usually finds another bug and again developer and again tester and it goes on like this which puts a lot of unnecessary labor to the tester. Instead, we could make an automation testing strategy that would check the requirements of the system every time the developer makes a change which would help us to save the precious time of ours. In that manner, automation is really a brilliant thing that helps us to reduce human labor and gives us a chance to spend our time more efficiently.

On another level, we can claim that it will increase the quality of testing as well since the computer’s capability is much higher than humans, it can look for many other test cases that humans would not have spare time to check.