INF115 Assignment 2

Deadline 21.04.2023 at 20:00

Assignment files

This assignment contains the following files:

- You have been provided with the `inf115.php` file and a folder named `style`, which includes a CSS file and a picture. The `inf115.php` file and the `style` folder must be located together.
- The file `uibay.sql` that you should import into your database.

Submission

You should submit a `zip` file that contains the following files:

- A `pdf` file named `ER.pdf`. The answers for Problem 1, Problem 2, and Problem 3 should be written in this file.
- You have been given a `PHP` file named `inf115.php` and a folder called `style` . Use the `inf115.php` file to provide solutions to Problem 4, Problem 5, Problem 6, and Problem 7.

Submitting both files successfully earns you 10 points - 5 points for each file, as described above. Late submissions will be subject to a 10% deduction for each day they are late. Also, please indicate the names of any students you collaborated with.

1 ER-Diagram and Normalization

You have been hired to create a database for a bank called UiBank. They need you to provide specific ER diagrams to developers such that they can implement your design. You must assess how each entity described below is to be represented in the database design (ER diagram). Below you can find the entities that are required and their respective properties:

Bank Branch

- A unique identification number (ID).
- The unique name of the branch.
- The address of the branch.

Customer

- A unique identifier for the customer (ID).
- The customer's name.
- A unique email address associated with the customer.
- The date the customer registered.
- The identifier for the branch where the customer has an account.
- A unique account number associated with the customer.
- The current balance in the customer's account.

ATM

- An ID that uniquely identifies the ATM.
- The physical address where the ATM is located.
- The ID of the branch that owns the ATM.
- The total amount of paper money bills that are available in the ATM.
- An indicator to show whether the ATM is active or not. If the value is TRUE, the ATM is active, otherwise, the value is FALSE.

See Practical Information Section for drawing ER diagrams.

Problem 1 (10 points)

Create an ER diagram of the data model. The diagram should represent the entities and their attributes. Mark primary and foreign keys, and include relational arrows.

Problem 2 (10 points)

The UiBank manager team decides to add the possibility that customers can have several accounts. Customers can have accounts in several branches, and in each branch also, there is a possibility of several accounts. For example, a customer named Stephen has two accounts in a branch called UiBank Fana and three in a branch called UiBank Kronstad.

1. (2 points) What is the problem with the current design?

2. (3 points) Suggest a solution to this problem by creating new tables.

3. (5 points) Draw an ER diagram for your solution.

Problem 3 (20 points)

Customers can draw money from ATMs. The UiBank managers want to keep track of customers' operations (transactions). Assume we have the following table of operations.

Customer ID	Operations
130	(ATM ID: 12, Draw money: 500 NOK, date: 02-08-2022), (ATM ID: 12, Draw money: 1000 NOK, date: 12-08-2022), (ATM ID: 16, Draw money: 400 NOK, date: 10-09-2022)
988	(ATM ID: 12, Draw money: 350 NOK, date: 18-08-2022), (ATM ID: 16, Draw money: 2000 NOK, date: 20-09-2022), (ATM ID: 23, Draw money: 300 NOK, date: 14-12-2022)
756	(ATM ID: 2, Draw money: 700 NOK, date: 17-07-2022), (ATM ID: 16, Draw money: 1500 NOK, date: 20-08-2022), (ATM ID: 19, Draw money: 400 NOK, date: 14-12-2022)
491	(ATM ID: 3, Draw money: 200 NOK, date: 18-07-2022), (ATM ID: 18, Draw money: 1500 NOK, date: 21-09-2022), (ATM ID: 2, Draw money: 600 NOK, date: 16-12-2022)

Table 1: Transactions Table

1. (5 points) Explain the Normal form 1NF and apply it to Table 1.

2. (5 points) Explain the Normal form 2NF and apply it to the table generated from 3.1.

3. (5 points) Explain the Normal form 3NF and apply it to the table or tables generated from 3.2.

4. (5 points) Explain the Normal form BCNF and apply it to the table or tables generated from 3.3.

2 HTML, PHP, and SQL

To solve problems 5, 6, and 7, you will need to use the `uibay.sql` database that you created in the first assignment. Import it into your database.

Write your code into a file called `inf115.php`. There should also be a `style` folder that contains the CSS file, which should be located alongside the `inf115.php` file.

Ensure to comment on any sections of your code that require further clarification and provide sources for any code you utilize.

For connecting to the database, we have the following code in `inf115.php`

```php
<?php
/*
Database configuration
*/

// Connection parameters
$host = ’localhost’;
$user = ’root’;
$password = ’’;
$db = ’assignment_2’;

// Connect to the database
$conn = mysqli_connect($host, $user, $password, $db);

// Connection check
if (!$conn) {
  exit(’Error: Could not connect to the database.’);
}

// Set the charset
mysqli_set_charset($conn, ’utf8’);
?>
```

If your database has a password, you should write `$password = "yourpassword"`.

Problem 4: HTML Form (10 points)

Create an HTML form to register a user. The form has the following fields:

- **Name**: a string of size at most 50.
- **Username**: a string consisting of combinations of alphabetic characters and numeric digits, with a length of no more than 50. It is **not** possible for the string to contain any spaces. For instance, ”farhad” and ”farhad23” are allowed, but ”farhad v” and ”farhad ze34” are not allowed.
- **Email**: a string of size at most 50 and must contain ”@”. The format is ”x@y.z” where ”x”, ”y”, and ”z” are strings that contain latin letters and digits.
- **Password**: a combination of letters and digits, **without any spaces**, in a string no longer than 50 characters.

If any of these fields are left empty or entered incorrectly, an error message should be displayed. The form should include both a ”Reset” and ”Submit” button. Clicking ”Reset” should clear all input fields, and clicking ”Submit” should display the message ”Successful Registration!” upon completion. We will put the following things to the test:

- Submitting the form by leaving one of the fields empty. In this case, the form should show an error message.
- Submitting the form by filling in one of the fields in the wrong format. In this case, the form should show an error message.
- Testing the "Reset" button.
- Submitting the form correctly. In this case, the form should show "Successful Registration!".

Check Practical Information section for defining a pattern on input.

Problem 5: Insert into Table (20 points)

Use the form in Problem 4 to register a new user in the "Users" table. In addition to restrictions in 4, the following should be considered:

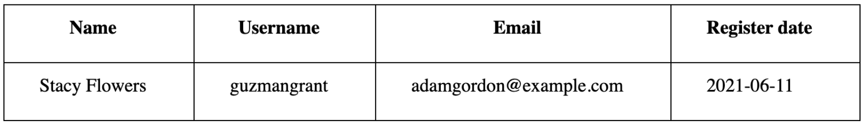
- If there is a user with the same "Email" or "Username" in the "Users" table, you should show the error: "There is a user with the same Username" or "There is a user with the same Email".
- The column `Registered_date` should be filled automatically.
- Passwords must be stored in an encrypted format. Check `https://www.w3schools.com/php/func_string_crypt.asp` for hash functions in PHP.

If the registration is successfully stored in the "Users" table, the form displays "Successful Registration!". We are going to test the following:

- Register a new user and check the "Users" table to see that the new user has been added.
- Register a new user with a username that already exists in the "Users" table to check that the form shows the error message.
- Register a new user with an email already in the "Users" table to check that the form shows the error message.
- Check that the `Registered_date` is registered automatically.
- Check that the `password` is encrypted.
- Check the successful registration message.

Problem 6: Show data (10 points)

Generate an HTML table that displays all users from the "Users" table. The table header should include "Name," "Username," "Email," and "Registered Date.



Name	Username	Email	Register date
Stacy Flowers	guzmangrant	adamgordon@example.com	2021-06-11

Figure 1: User Table

Figure 1 is an example. The template is included in `inf115.php`, and you must fill in the table.

Problem 7: Search data (10 points)

Create an HTML form to search in the "Products" table. The form should have the following fields:

- Model
- Category
- Brand

The form features a "Search" button that returns the corresponding search results. These results should be displayed in an HTML table. Note that not all fields are compulsory, and the result should be based on the "AND" combination. For example,

```
SELECT * FROM `Products` WHERE `brand` LIKE '%X%' AND `category`
    LIKE '%Y%' AND `model` LIKE '%Z%'
```

`%X%` means the brand contains the string `X` as substring.

Practical information

- There are several free tools available for drawing ER diagrams. Here are some options:

  - **Lucidchart**: Lucidchart is an online diagramming tool that offers a free version with limited features. It includes templates for ER diagrams and allows for collaborative editing.
  - **draw.io**: draw.io is an open-source diagramming tool that can be used online or as a desktop application. It includes templates for ER diagrams and allows for exporting diagrams in various formats.
  - **MySQL Workbench**: MySQL Workbench is a database design and management tool that includes a visual editor for creating ER diagrams. It is free and open-source, and also includes features for database modeling and SQL development.
  - **Dia**: Dia is a desktop application for creating diagrams, including ER diagrams. It is free and open-source and includes various templates and shapes for creating diagrams.
  - **Visual Paradigm**: Visual Paradigm is a diagramming and modeling tool that offers a free community edition with limited features. It includes templates and tools for creating ER diagrams, as well as other database design features.

- We recommend you complete this assignment using the XAMPP software stack. You need to setup this stack on your computer. You can download the latest release of XAMPP from `https://www.apachefriends.org/index.html`.

- This task is web oriented, and you are supposed to connect your front-end (HTML and PHP) to the backend (SQL on XAMPP). The ”A” in XAMPP means Apache, and Apache is an HTTP server that looks for front-end files like PHP files in the folder called ”htdocs” (default front-end folder). You should place the given `inf115.php` file inside the XAMPP htdocs folder. Its location differs between operating systems.

  Once you have done this, you can see the resulting webpage in your browser at `localhost/inf115.php`

- We recommend checking `https://www.w3schools.com` for HTML and PHP codes.

- For defining a pattern on input, we suggest using the `pattern` option in HTML. Check `https://www.w3schools.com/TAGS/att_input_pattern.asp` for more information. Regular expressions are used for defining patterns. For example

```
<input type="text" pattern="\+([0-9]+)">
```

defines a string that begins with + and contains the numbers 0 through 9. Check https://www.sitepoint.com/learn-regex/ for how to define regular expressions.

Running a PHP File on Windows, Mac OS, and Linux

Refer to the XAMPP FAQ given above. Some other useful links:

- Windows: https://www.edureka.co/blog/how-to-run-a-php-program-in-xampp and https://www.techwalla.com/articles/how-to-run-a-php-file-in-xampp
- Mac OS: https://www.webucator.com/how-to/how-install-start-test-xampp-on-mac-osx.cfm
- Linux: If you have downloaded the `inf115.php` file to your `Downloads` directory, you can use the following terminal command to move the folder to the right place.

  ```
  mv ~/Downloads/inf115.php /opt/lampp/htdocs/
  ```

  You might need to change the permission of the files you just placed in your htdocs to be able to write and save. Do this by running the following command in your terminal.

  ```
  sudo chmod -R 777 /opt/lampp/htdocs
  ```

  Once this is done, open the `/opt/lampp/htdocs/inf115.php` file with your favorite text editor or IDE and write your solutions.

  To start Xammp, run the following command:

  ```
  sudo /opt/lampp/lampp start
  ```

  Check https://vitux.com/ubuntu-xampp/ for more information on Ubuntu.

Example of PHP and HTML

```
<h4>Form for Phone Number </h4>
<p> Format is: <code>+&lt;CountryCode>&lt;Number></code>
<?php
if (isset($_POST['formForPhone_phone'])) {
  $phone = $_POST['formForPhone_phone'];
}
?>
<form method="post" action="inf115.php">
  <label for="formForPhone">Phone Number:</label>
  <input type="text" id="formForPhone_phone" name="formForPhone_phone"
  pattern="\+([0-9]+)" title="Phone number with country code. Ex: '+4711111111'" required><br><br>
  <!-- name: is used to get the value from the form -->
```

```
13    <!-- pattern: is used to define a pattern in regular expression
        format -->
14    <input type="submit" >
15  </form>
16
17  <?php if (isset($phone))
18  {
19    $result = "<h3> Entered phone:".$phone." </h3>";
20    echo $result;
21  }
22  ?>
```

The provided code is designed to handle form input for phone numbers in the format of `+<numbers>`, which is specified by the `pattern` option in the HTML input element. The input element has the name `formForPhone_phone`. The `method` attribute of the form determines how the form data will be sent, and more details can be found at `https://www.w3schools.com/tags/att_form_method.asp`. For this form, the "method" attribute is set to `method="post"`. The `action` attribute specifies where the form data should be sent when the form is submitted, and additional information can be found at `https://www.w3schools.com/tags/att_form_action.asp`. In this case, the `action` attribute is set to `inf115.php`, which calls the `inf115.php` file.

After the form is submitted, the code checks if a token with the name `formForPhone_phone` has been set. If so, a variable named `$phone` is created with the value that the user submitted in the form. In line 17, PHP checks if the `$phone` variable has been set, and if so, the value of the variable is printed on line 20.