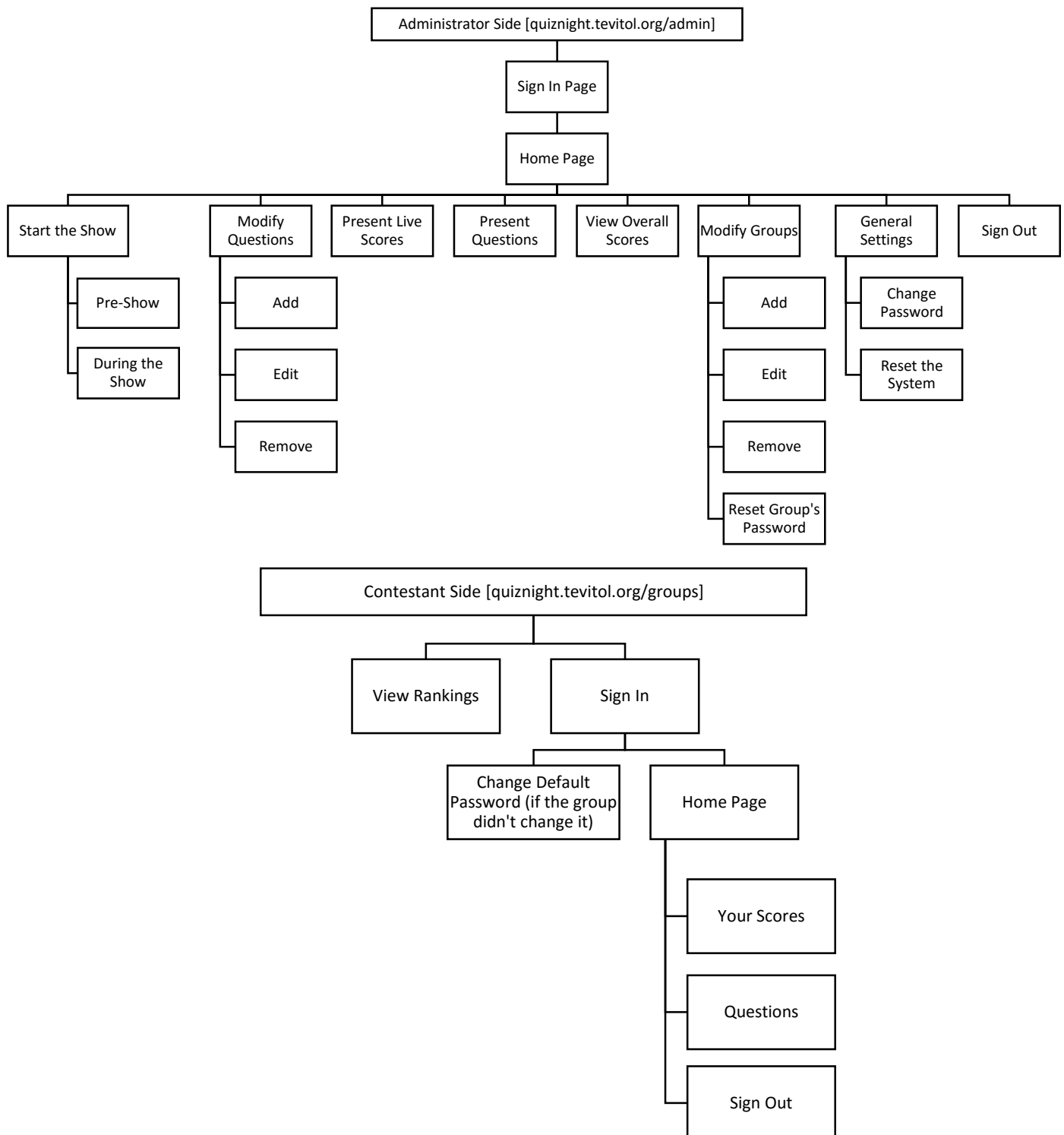# Criterion E: Product development

Complex techniques used to address the client's requirements:

- ➢ Multimedia
  - o Cascading style sheets (CSS)
  - o Manipulation of codes such as HTML, PHP, and JQuery to customize pages and improve functionality
  - o Navigation using frames and customized buttons

- ➢ Relational Databases
  - o Three appropriately related tables
  - o Appropriate use of data validation

- ➢ Code and programming tools
  - o Arrays
  - o Parameter Passing
  - o Loops, if–then, exit conditions

Organization of the Product (Website)

Client's need was a browser-based interactive website that can be easily used on both mobile devices and computers during his show, called Quiz Night. For this purpose, a website is decided to meet needs of the client successfully. The structure is given below:

```
Administrator Side [quiznight.tevitol.org/admin]
    │
    Sign In Page
    │
    Home Page
    ├── Start the Show
    │       ├── Pre-Show
    │       └── During the Show
    ├── Modify Questions
    │       ├── Add
    │       ├── Edit
    │       └── Remove
    ├── Present Live Scores
    ├── Present Questions
    ├── View Overall Scores
    ├── Modify Groups
    │       ├── Add
    │       ├── Edit
    │       ├── Remove
    │       └── Reset Group's Password
    ├── General Settings
    │       ├── Change Password
    │       └── Reset the System
    └── Sign Out
```

```
Contestant Side [quiznight.tevitol.org/groups]
    ├── View Rankings
    └── Sign In
            ├── Change Default Password (if the group didn't change it)
            └── Home Page
                    ├── Your Scores
                    ├── Questions
                    └── Sign Out
```
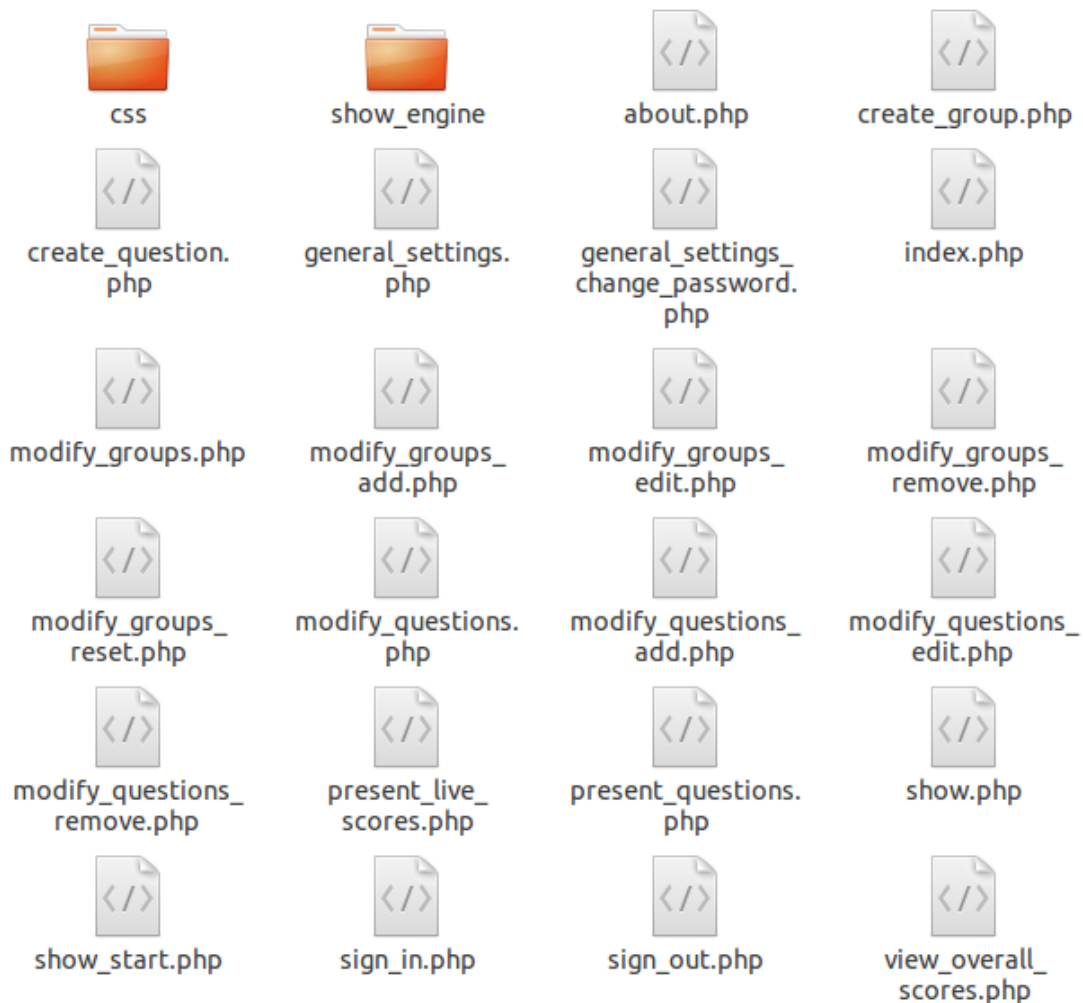
The website is constructed in a way that separates contestants and administrators. They do not have permission to access each other's page.
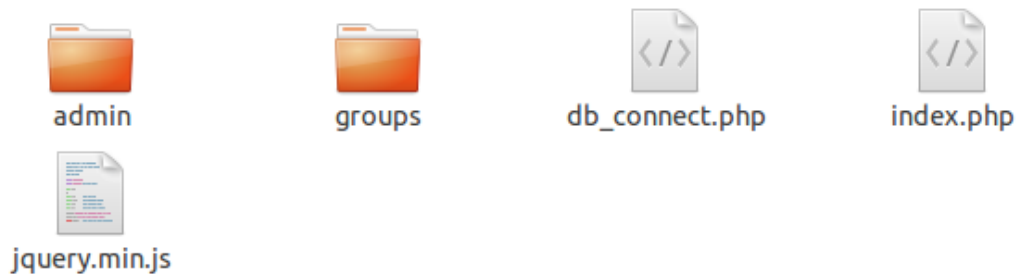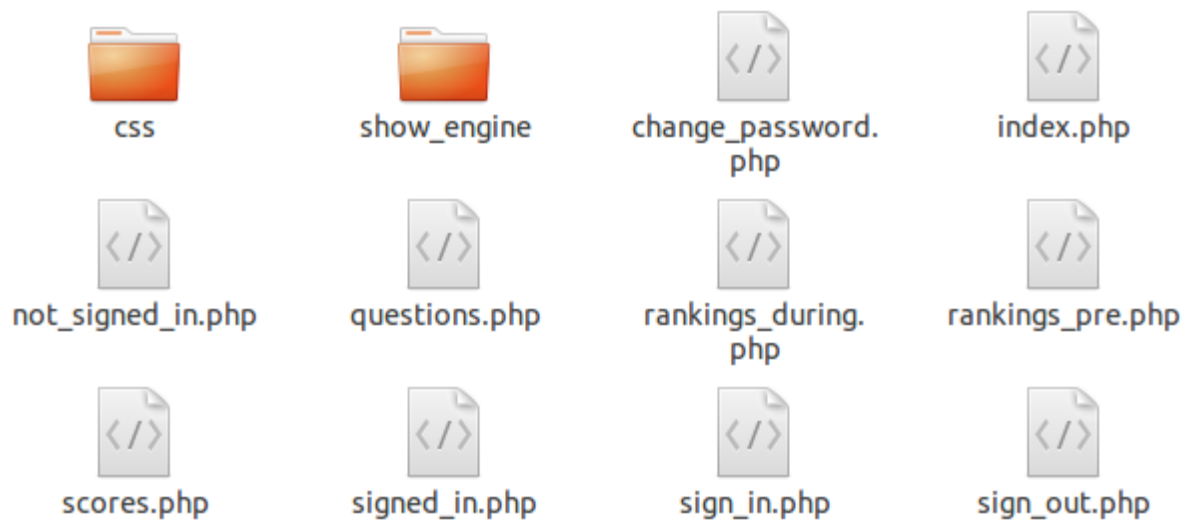
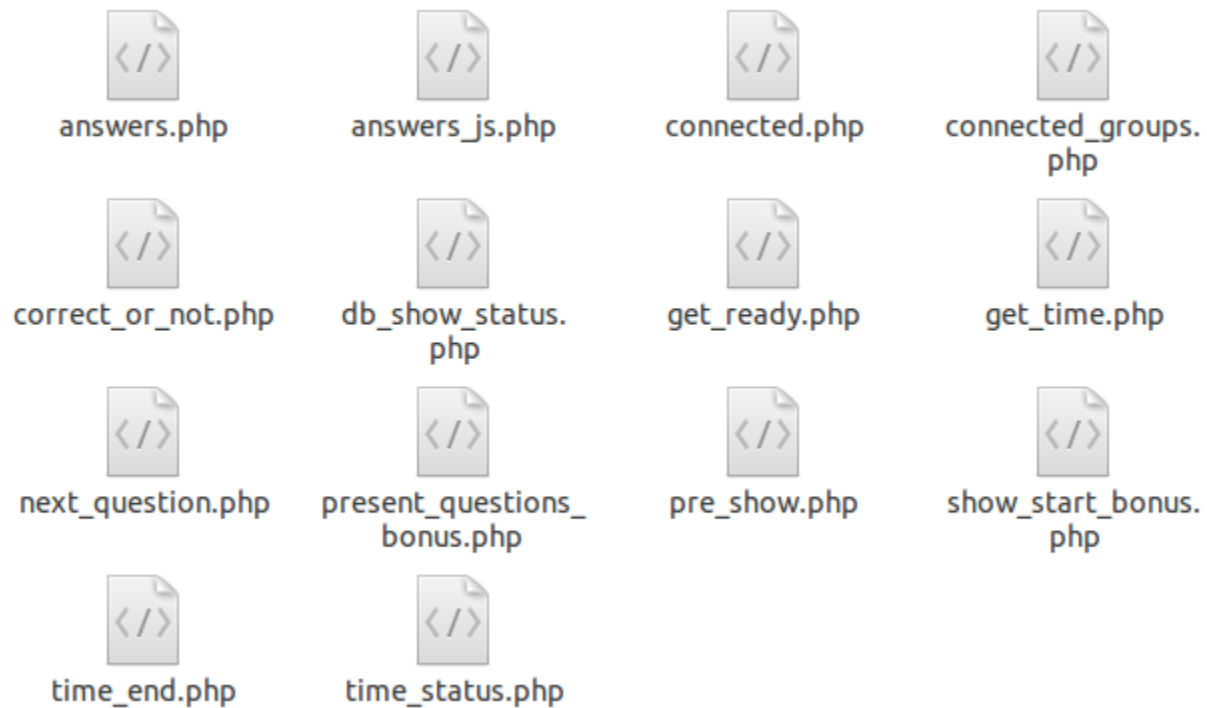

Figure 2 – The main folder

The contents are stored on server. There are two separate folders for admin and groups side which contain corresponding PHP and CSS files. Index.php redirects users to groups folder and db_connect.php contains required information to connect to database. "show_engine" folders contain PHP files that help main pages to manipulate data.
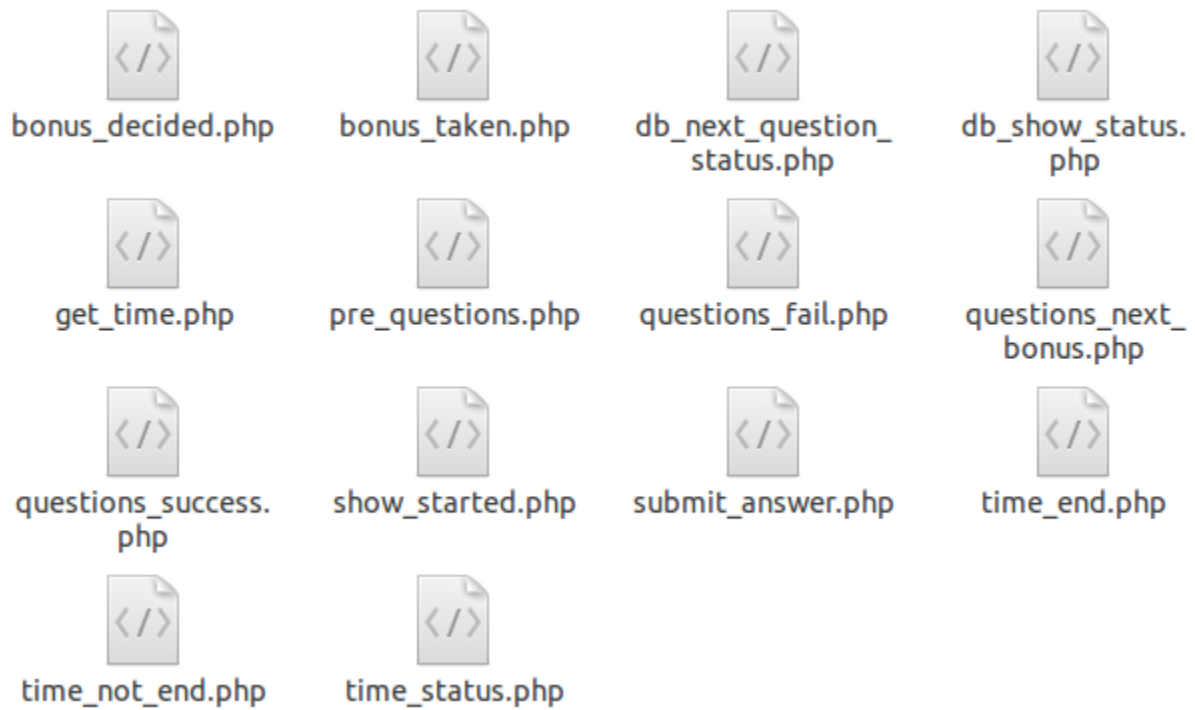

Figure 3 – Inside of "admin" folder

css show_engine change_password.php index.php

not_signed_in.php questions.php rankings_during.php rankings_pre.php

scores.php signed_in.php sign_in.php sign_out.php

Figure 4 - Inside of "groups" folder

answers.php answers_js.php connected.php connected_groups.php

correct_or_not.php db_show_status.php get_ready.php get_time.php

next_question.php present_questions_bonus.php pre_show.php show_start_bonus.php

time_end.php time_status.php

Figure 5 - Inside of "show_engine" folder in "admin" folder

bonus_decided.php

bonus_taken.php

db_next_question_
status.php

db_show_status.
php

get_time.php

pre_questions.php

questions_fail.php

questions_next_
bonus.php

questions_success.
php

show_started.php

submit_answer.php

time_end.php

time_not_end.php

time_status.php

Figure 6 - Inside of "show_engine" folder in "groups" folder

Multimedia

Cascading style sheets (CSS)

In this project, Cascading style sheet (CSS) and HTML used together to create a consistent user interface for the Quiz Night system. There are different groups of pages related to each other with same layout, but different content.

Admin Panel | Modify Questions | Modify Groups | General Settings

Add Question | Edit Question | Remove Question

> Same type of buttons
> With different names

Current Questions:

#	Question	Answer	Bonus	Type
1	Paris'te imzalanan iklim değişikliği paktı hangi kısaltma altında yapılmıştır??	COP 21 (UN climate "c"onference "o"f "p"arties)	No	Normal
2	Hangi ünlü Amerikan outdoor firması kurucusu rafting yaparken hipotermi yüzünden hayatını kaybetti?	The North Face	No	Normal
3	Nöbel ödülleri 10 Kasımda hangi iki şehirde sahiplerine verilmiştir?	Stockholm / Oslo	No	Normal
4	2016'da dijital versiyonuna geçirileceği duyurulan ve Türkiye'deki 20 milyon taşıtı etkileyecek olan şey nedir?	Radyo	No	
5	Star Wars Güç Uyanıyor'un galası hangi şehirde yapılmıştır?	Los Angeles	No	Normal
6	Uluslararası Antalya Film Festivali'nde Altın Portakal en iyi film ödülünü hangi film almıştır?	Sarmaşık	No	Normal

> Same table
> Different values

> Same font
> Underlined when clicked

Admin Panel | Modify Questions | Modify Groups | General Settings

Add Group | Edit Group | Remove Group | Reset Group Password

Current Groups:

#	Group Name	12th Grade	11th Grade	10th Grade	9th Grade	Prep	Teacher/Personnel	Extra
1	Topçular Birliği	Akıncan Başar	Barkın Şimşek	Korcan Koç	-	-	-	Sinan Kurtulmuş
2	4 Gün Yürüyemedi	Utku Saraçoğlu	Efe Bayramgürler	Ege Eren	-	-	-	-
3	Lölölöl	Utku	Barkın	Kendal	Tuluk	Ali	Alan	-
4	Has Kürtler Sarışın Olur	Dadlez Sabak	Ozan Baykan	-	-	-	Cafer Elitoğ	Bergüm Ergün

Figures 7 & 8 - Same layout, different content

The integration between CSS and HTML is achieved by using division tag (<div>) and HTML body tags. Then assigning id for every content will link them. Here is the tag Id's used in CSS file:

```css
body {
    font-family: 'Open Sans';
    font-size: 20px;
    background-color: rgb(255, 255, 255);
}

#navigation {
    float: none;
    height: 50px;
    margin-left: auto;
    margin-top: 0px;
    clear: none;
    width: 1000px;
    background-color: rgb(255, 255, 255);
    margin-right: auto;
    min-width: 0px;
    position: relative;
    padding-left: 0px;
    border-bottom-color: rgba(0, 0, 0, 0.4);
    border-bottom-width: 1px;
```

Font type and size is consistent between pages

Background color is consistent between pages

Float, margins and padding help to position objects in the design

```html
</head>
<body>
    <div id="primaryContainer" class="primaryContainer clearfix">
        <div id="line" class="clearfix">
        </div>
        <div id="navigation" class="clearfix">
            <a id="text" href="index.php">
            Admin Panel
            </a>
            <p id="text1">
                &#x7c;
            </p>
            <a id="text2" href="modify_questions.php">
            Modify Questions
            </a>
            <p id="text3">
                &#x7c;
            </p>
            <a id="text4" href="modify_groups.php">
            Modify Groups
            </a>
            <p id="text5">
                &#x7c;
            </p>
            <a id="text6" href="general_settings.php">
            General Settings
            </a>
        </div>
```

Red boxes indicate used HTML tags

Corresponding HTML code can be found below.

Also, CSS file must be linked to the main page using the single line HTML code below:

```html
<link rel="stylesheet" href="../admin/css/general_settings.css">
```

Manipulation of codes such as HTML, PHP, and JQuery to customize pages and improve functionality

The website consists of integration between HTML and PHP enhanced by JQuery. I used those languages because I feel confident with them, and there are many online forums to get help.

Most of the pages contain dynamically generated parts like lists and menus. The code block below is generating a checkbox menu based on the information in database.

```php
if($time_end == 1){
    if($row[3] == 1){
        echo "<td><div id='ck-button' ><label>";
        echo "<input type='checkbox' id='chk";
        echo $row[0];
        echo "' checked='checked' hidden='hidden' /><span ";
            echo "id='caption";
            echo $row[0];
            echo "'>";
            echo "Correct";
            echo "</span>";
            echo "</label></div></td>";
    }else {
        echo "<td><div id='ck-button' ><label>";
        echo "<input type='checkbox' id='chk";
        echo $row[0];
        echo "' hidden='hidden' /><span ";
            echo "id='caption";
            echo $row[0];
            echo "'>";
            echo "False";
            echo "</span>";
            echo "</label></div></td>";
    }
}
```

Figure 12 – A code block from answers.php page

In the example, if statement checks the record from database and decide to output checkbox as checked or not.

In addition to example mentioned above, the following code block manipulates JQuery code in order to make buttons functional. Without the code block buttons just appear on the page without any function. However, buttons perform as expected with the help of code below. When they are clicked, JQuery code gets triggered any runs correct_or_not.php page to either add or remove 5 points to groups' total points.

Every button has its ID and a JQuery code corresponding to their ID. Thus, PHP pages manupilate data according to ID.

```php
$sql = "SELECT * FROM temp_answer";
$query = mysql_query($sql);
while($row = mysql_fetch_row($query)){
    echo "
    $('#chk'+'";
    echo $row[0];
    echo "').on('click', function() {
    var buttonId = '";
    echo $row[0];
    echo "';
    if ($(this).is(':checked')) {
        var buttonState = '1';
        document.getElementById('caption'+'";
        echo $row[0];
        echo "').innerHTML = 'Correct';

        $.post('../admin/show_engine/correct_or_not.php',
        {button_id:buttonId, button_state:buttonState});

        }else {
        var buttonState = '0';
        document.getElementById('caption'+'";
        echo $row[0];
        echo "').innerHTML = 'False';

        $.post('../admin/show_engine/correct_or_not.php',
        {button_id:buttonId, button_state:buttonState});

        }
});";
```

Figure 13 – A code block from answers_js.php page

```php
//getting variables
$group_ID = $_POST['button_id'];
$button_state = $_POST['button_state'];
$current_question_ID = $_SESSION['current_question_ID'];
$sql_question_ID = "q".$current_question_ID;

//getting the bonus information of the group
$sql = "SELECT * FROM temp_answer WHERE group_ID = '$group_ID' ";
$query = mysql_query($sql);
while($row = mysql_fetch_row($query)){
    $bonus_state = $row[1];
}

if(($button_state == 1)&&($bonus_state == 1)){
    $sql = "UPDATE temp_scores SET $sql_question_ID = '15' WHERE group_ID = '$group_ID'";
    mysql_query($sql);

    $sql = "UPDATE temp_answer SET correct = '1' WHERE group_ID = '$group_ID'";
    mysql_query($sql);
}elseif(($button_state == 1)&&($bonus_state == 0)){
    $sql = "UPDATE temp_scores SET $sql_question_ID = '5' WHERE group_ID = '$group_ID'";
    mysql_query($sql);

    $sql = "UPDATE temp_answer SET correct = '1' WHERE group_ID = '$group_ID'";
    mysql_query($sql);
}elseif(($button_state == 0)&&($bonus_state == 1)){
    $sql = "UPDATE temp_scores SET $sql_question_ID = '-15' WHERE group_ID = '$group_ID'";
    mysql_query($sql);

    $sql = "UPDATE temp_answer SET correct = '0' WHERE group_ID = '$group_ID'";
    mysql_query($sql);
}elseif(($button_state == 0)&&($bonus_state == 0)){
    $sql = "UPDATE temp_scores SET $sql_question_ID = '0' WHERE group_ID = '$group_ID'";
    mysql_query($sql);

    $sql = "UPDATE temp_answer SET correct = '0' WHERE group_ID = '$group_ID'";
    mysql_query($sql);
}

//summing scores from each question to get total score
$sql = "SELECT * FROM temp_scores WHERE group_ID='$group_ID'";
$query = mysql_query($sql);
while($row = mysql_fetch_row($query)){
    $total = $row[1] + $row[2] + $row[3] + $row[4] + $row[5] + $row[6] + $row[7] + $row[8]
    + $row[9] + $row[10] + $row[11] + $row[12] + $row[13] + $row[14] + $row[15] + $row[16]
    + $row[17] + $row[18] + $row[19] + $row[20];
}

$query = "UPDATE temp_scores SET total='$total' WHERE group_ID='$group_ID'";
mysql_query($query);
```

Button ID sent by JQuery is defined to the variable $group_ID

$group_ID is used in the MySQL command.

Manipulated MySQL command.

Figure 14 – A code block from correct_or_not. php page

Currently, 2 groups are connected to the system.
Connected groups: 1, 2
Current question: 2

— Current Question: —————————————————

Hangi ünlü Amerikan outdoor firması kurucusu rafting yaparken hipotermi yüzünden hayatını kaybetti?

— Answer for Current Question: ————————————
The North Face

Group Number	Bonus or Not	Groups' Answers	Check
1	-	Ali	False
2	-	Veli 1998	False

Confirm and proceed to next question

- Table changes dynamically and added new lines as the new answers recorded to database.
- Groups' Answers are taken from the database.

Currently, 4 groups are connected to the system.
Connected groups: 1, 2, 3, 4
Current question: 6

— Current Question: —————————————————

Uluslararası Antalya Film Festivali'nde Altın Portakal en iyi film ödülünü hangi film almıştır?

— Answer for Current Question: ————————————
Sarmaşık

Group Number	Bonus or Not	Groups' Answers	Check
1	-	Lorem ipsum	False
2	-	Lorem ipsum	False
3	-	Lorem ipsum	False
4	-	Lorem ipsum	False

Confirm and proceed to next question

Figures 15 & 16 - Result of the code block indicated

Admin Panel | Start the Show |Present Live Scores | Present Questions

Currently, 2 groups are connected to the system.
Connected groups: 1, 2
Current question: 2

Current Question:
Hangi ünlü Amerikan outdoor firması kurucusu rafting yaparken hipotermi yüzünden hayatını kaybetti?

Answer for Current Question:
The North Face

Group Number	Bonus or Not	Groups' Answers	Check
1	-	Ali	False
2	-	Veli 1998	Correct

Confirm and proceed to next question

Admin Panel | Start the Show |Present Live Scores | Present Questions

Currently, 2 groups are connected to the system.
Connected groups: 1, 2
Current question: 2

Current Question:
Hangi ünlü Amerikan outdoor fir[...]den hayatını kaybetti?

Answer for Current Question:
The North Face

- Color and text of the checkbox button changes when pressed.
- JQuery script runs a SQL command to database add or remove 5 points from corresponding group.

Group Number	Bonus or Not	Groups' Answers	Check
1	-	Ali	False
2	-	Veli 1998	False

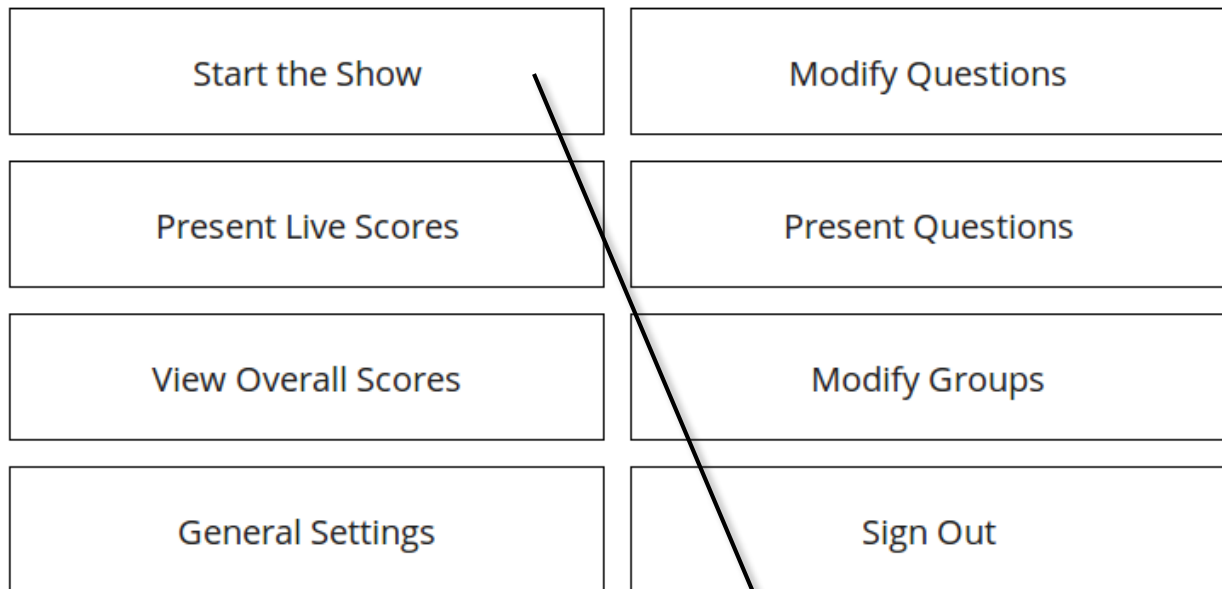Confirm and proceed to next question

Figures 17 & 18 - Result of the code block indicated
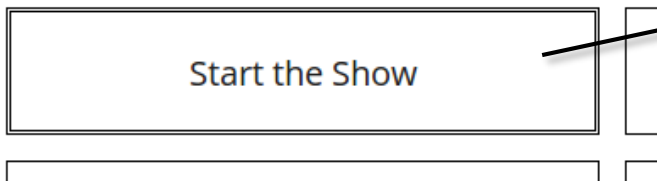
Navigation using frames and customized buttons

Navigation of website entirely relies on customized buttons. CSS is used to make them interactive and provide easy access for users.

Hello!

Currently, 1 group is connected to the system.

Start the Show	Modify Questions
Present Live Scores	Present Questions
View Overall Scores	Modify Groups
General Settings	Sign Out

Currently, 1 group is connected to the syst

Start the Show
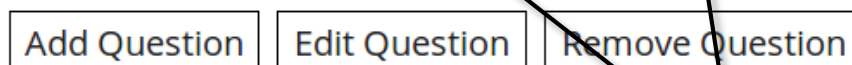
Border is doubled when hovered.

Admin Panel | Modify Questions | <u>Modify Groups</u> | General Settings

| Add Group | Edit Group | Remove Group | Reset Group Password |

Admin Panel | <u>Modify Questions</u> | Modify Groups | General Settings

| Add Question | Edit Question | Remove Question |

Current page is underlined

Relational Databases

Three appropriately related tables

	# Column	Type	Collation	Attributes	Null	Default	Extra	Action
☐	1 group_ID	int(5)			No	None		🖉 Change ⊖ Drop More ▾
☐	2 bonus_or_not	int(1)			No	0		🖉 Change ⊖ Drop More ▾
☐	3 answer	varchar(500)	utf8_turkish_ci		Yes	NULL		🖉 Change ⊖ Drop More ▾
☐	4 correct	int(1)			No	0		🖉 Change ⊖ Drop More ▾

	# Column	Type	Collation	Attributes	Null	Default	Extra	Action
☐	1 group_ID	int(5)			No	None		🖉 Change ⊖ Drop More ▾
☐	2 december	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	3 january	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	4 february	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	5 march	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	6 april	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	7 may	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	8 total	int(5)			No	0		🖉 Change ⊖ Drop More ▾

	# Column	Type	Collation	Attributes	Null	Default	Extra	Action
☐	1 group_ID	int(5)			No	None		🖉 Change ⊖ Drop More ▾
☐	2 q1	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	3 q2	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	4 q3	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	5 q4	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	6 q5	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	7 q6	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	8 q7	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	9 q8	int(5)			No	0		🖉 Change ⊖ Drop More ▾
☐	10 q9	int(5)			No	0		🖉 Change ⊖ Drop More ▾

	Table	Action	Rows	Type	Collation	Size	Overhead
☐	admin	📋 Browse 🔧 Structure 🔍 Search ➕ Insert 🗑 Empty ⊖ Drop	1	MyISAM	utf8_turkish_ci	2.1 KiB	-
☐	groups	📋 Browse 🔧 Structure 🔍 Search ➕ Insert 🗑 Empty ⊖ Drop	20	MyISAM	utf8_turkish_ci	4.3 KiB	20 B
☐	questions	📋 Browse 🔧 Structure 🔍 Search ➕ Insert 🗑 Empty ⊖ Drop	21	MyISAM	utf8_turkish_ci	5.1 KiB	-
☐	temp_answer	📋 Browse 🔧 Structure 🔍 Search ➕ Insert 🗑 Empty ⊖ Drop	1	MyISAM	utf8_turkish_ci	2.0 KiB	-
☐	temp_scores	📋 Browse 🔧 Structure 🔍 Search ➕ Insert 🗑 Empty ⊖ Drop	1	MyISAM	utf8_turkish_ci	2.2 KiB	89 B
☐	total_scores	📋 Browse 🔧 Structure 🔍 Search ➕ Insert 🗑 Empty ⊖ Drop	1	MyISAM	utf8_turkish_ci	2.1 KiB	99 B
	6 tables	Sum	45	MyISAM	utf8_general_ci	17.8 KiB	208 B

Figures 23, 24, and 25 – Screenshots from phpMyAdmin interface

admin
username
password
time_limit
next_question
current_question_ID
show_started
bonus_time

groups
*group_ID
group_Name
grade_12
grade_11
grade_10
grade_9
prep
teacher_personnel
extra
password
connected
bonus_taken

Questions
*question_ID
question
answer
bonus_or_not
type

temp_answer
group_ID
bonus_or_not
answer
correct

total_scores
group_ID
december
january
february
march
april
may
total

temp_scores
group_ID
q1
q2
q3
q4
q5
q6
q7
q8
q9
q10
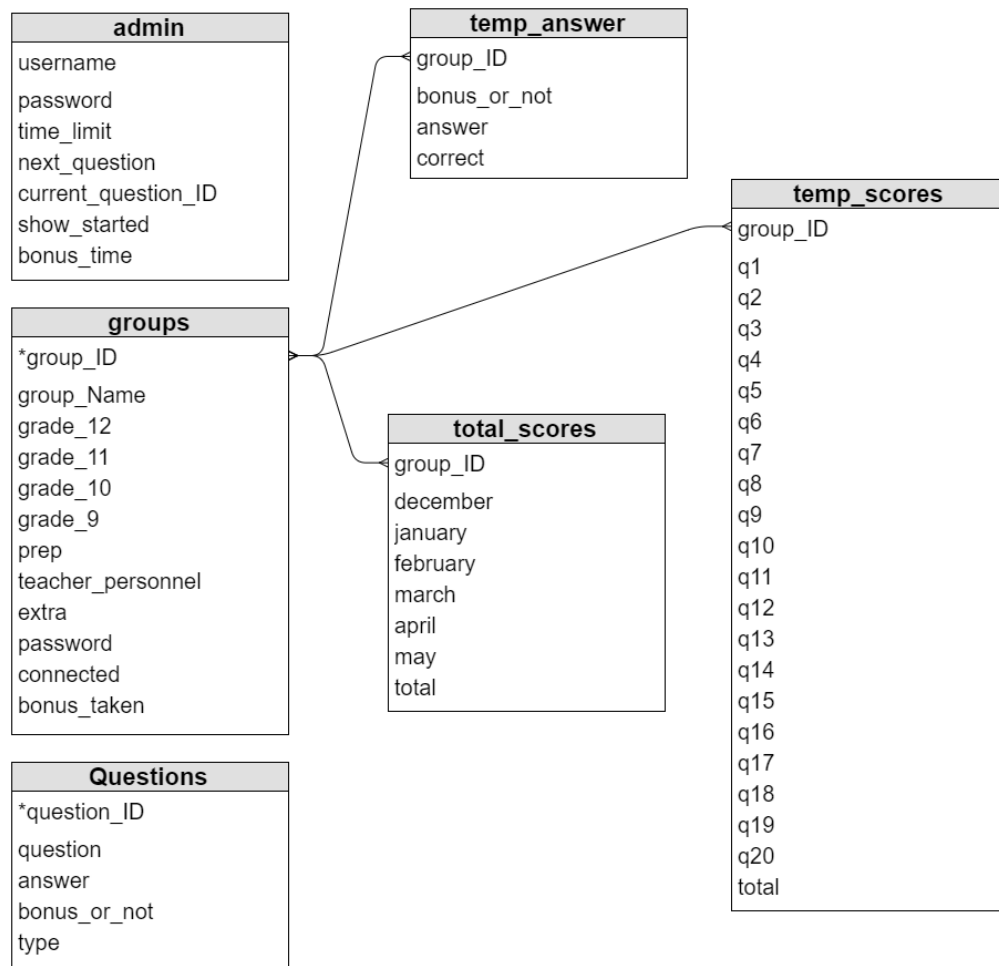q11
q12
q13
q14
q15
q16
q17
q18
q19
q20
total

Figure 26 – Entity relationship

Since Quiz Night is based on data transaction, the database is an essential part of the project. Considering the amount of data transaction happening during the competition, a relational database should be used to avoid data redundancy. The database includes six tables as can be seen in entity relationship above. Those six tables are admin, groups, questions, total_scores, temp_answer, temp_scores. PhpMyAdmin doesn't show tables in the relational view, but it can be seen from the entity relationship diagram that group_ID is the primary key in groups table and foreign key in temp_answer, total_scores, temp_scores.

Appropriate use of data validation

There are certain data types and lengths for tables in the database, which means if an improper data is available in query, results of that query will be rejected. By that way, data validation for the database is provided, and any improper data is rejected. For example, a group_ID can only be a number with maximum length of five characters. Anything beyond that will be rejected.

Code and programming tools

Arrays

Arrays are used very widely in the website, and it is a good way of storing a large amount of data as a list in a single variable. Here is an example:

```php
//summing scores from each question to get total score
$sql = "SELECT * FROM temp_scores WHERE group_ID='$group_ID'";
$query = mysql_query($sql);
while($row = mysql_fetch_row($query)){
    $total = $row[1] + $row[2] + $row[3] + $row[4] + $row[5] + $row[6] + $row[7] + $row[8] +
    $row[9] + $row[10] + $row[11] + $row[12] + $row[13] + $row[14] + $row[15] + $row[16] +
    $row[17] + $row[18] + $row[19] + $row[20];
}
```

In the example, data of temporary scores of the groups are gathered from database using SQL commands. Then, mysql_fetch_row command arranges gathered data into an array and that data is used to calculate total scores of each group.

Loops, if–then, exit conditions

Loops are used very widely in website, and they are used to automate processes that repeats. In the example above, code block checks every column in table in database in a while loop:

```php
while($row = mysql_fetch_row($query)){
    $bonus_state = $row[1];
}
```

If-then code blocks are used very widely to compare and contrast variables or situations:

```php
$connected = count($connected_groups);

$last = $connected - 1;
for($x = 0; $x < $connected; $x++) {
    if($x == $last){
        echo $connected_groups[$x];
    }else{
        echo $connected_groups[$x];
        echo ", ";
    }
}
```

In the example above, the code block combines each number of the connected groups by separating them using a comma. It gives an output like "1, 7, 9" etc. Every time, "for condition" checks, if the variable $x is smaller than the variable $connected. "If condition" checks if

variable, $x is equal to variable $last to stop putting a comma after the last number. That prevents code block from outputting something like "1, 7, 9,".

Parameter Passing

Parameter passing is one the most used techniques in website because of the nature of the Quiz Night. There are many users (approximately 20) that are connecting at the same time. Thus, passing variables using session variables and local variables is very common, useful, and time-saving. For example, the code block below takes a parameter from the session variable called $_SESSION['login'] and passes that parameter to local variable called $login. By that way, the system can control if the user is logged in or not.

```php
$login = $_SESSION['login'];

if(!isset($_SESSION['login'])||$_SESSION['login']!=1){
    header('location:../sign_in.php');
}
```

Acknowledgment of Third-Party Code

"jquery.min.js" is gathered from corresponding resources acknowledged in criterion D.

875 Words