



ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ

ΣΧΟΛΗ ΗΛΕΚΤΡΟΛΟΓΩΝ ΜΗΧΑΝΙΚΩΝ

ΚΑΙ ΜΗΧΑΝΙΚΩΝ ΥΠΟΛΟΓΙΣΤΩΝ

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ΣΥΣΤΗΜΑΤΩΝ ΠΛΗΡΟΦΟΡΙΚΗΣ**

YAHITZEE GAME

ΠΑΙΧΝΙΔΙ YAHITZEE

ΔΙΠΛΩΜΑΤΙΚΗ ΕΡΓΑΣΙΑ

ΠΑΝΑΓΙΩΤΑ Ι. ΜΠΟΥΤΡΟΥ

**Επιβλέπων: Γεώργιος Στασινόπουλος
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Αθήνα, Μάιος 2011



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Οι απόψεις και τα συμπεράσματα που περιέχονται σε αυτό το έγγραφο εκφράζουν τον συγγραφέα και δεν πρέπει να ερμηνευθεί ότι αντιπροσωπεύουν τις επίσημες θέσεις του Εθνικού Μετσόβιου Πολυτεχνείου.

Abstract

In the following pages, the game of Yahtzee is presented which is a dice game with poker rules. The Yahtzee rules are given. The Yahtzee game supports different sound effects and a registered player has the possibility to save his highscore. The game has been developed as a web and desktop application. Also, it has been built as a cross-platform application for iOS, Symbian, Android, webOS, BlackBerry devices. In the last chapter, technical notes about the development of Yahtzee are presented.

Περίληψη

Στις σελίδες που ακολουθούν παρουσιάζεται το παιχνίδι Yahtzee, ένα παιχνίδι ζαριών με κανόνες πόκερ. Οι κανόνες Yahtzee δίνονται. Το παιχνίδι υποστηρίζει διάφορα ηχητικά εφέ και ένας εγγεγραμμένος παίκτης έχει τη δυνατότητα να αποθηκεύει το μεγαλύτερό του σκόρ. Το παιχνίδι έχει δημιουργηθεί ως μια "web" και "desktop" εφαρμογή. Επίσης έχει σχεδιασθεί ως εφαρμογή ανεξαρτήτου πλατφόρμας για iOS, Symbian, Android, webOS, BlackBerry συσκευές.

Στο τελευταίο κεφάλαιο, δίνονται τεχνικές σημειώσεις για την κατασκευή του παιχνιδιού.

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1.Introduction

Yahtzee is a dice game made by Milton Bradley (now owned by Hasbro), which was first marketed by game entrepreneur Edwin S. Lowe in 1956. The game is a development of earlier dice games, such as Yacht and Generala. The object of the game is to score the most points by rolling five dice to make certain combinations. The dice can be rolled up to three times in a turn to try to make one of the thirteen possible scoring combinations. A game consists of thirteen rounds during which the player chooses which scoring combination is to be used in that round. Once a combination has been used in the game, it cannot be used again.

The scoring combinations have varying point values, some of which are fixed values and others of which have the cumulative value of the dice. A Yahtzee is five-of-a-kind and holds the game's highest point value of 50 (not counting multiple "Yahtzees" in the same

game). Yahtzee was marketed by the E.S. Lowe company from 1956 to 1973. In 1973, the Milton Bradley Company purchased the E.S. Lowe Company and assumed the rights to produce and sell Yahtzee. During Lowe's ownership over 40 million Yahtzee games were sold in America and around the globe. The game has maintained its popularity. According to current owner Hasbro, 50 million Yahtzee games are sold each year.

1.1 Description of the present diploma thesis

In the following pages, the game of Yahtzee is presented which is a dice game with poker rules. Initially, the history of Yahtzee is introduced and the rules of game follow. Then, some screenshots of the game are given and the possibility of Yahtzee player to play with highscores is also described. The next stage is to feature the sounds of Yahtzee and the Yahtzee game as a web or as a cross-platform mobile

application. In the eighth chapter, some technical notes about Yahtzee are given, especially the development and programming tools. Explanations of some parts of the game are also analyzed, as well as technical notes about the sound and the mobile application of Yahtzee.

1.2 History of Yahtzee

Yahtzee is one of the most beloved games in our culture, as well as one of the best known games. People have been playing this fascinating dice game since the conception of the game.

It's now been over 50 years since the game was first born and it still holds the same excitement and thrill that it did when it was invented in 1954. In fact, it is estimated that over 90% of Americans are familiar or have played the game of Yahtzee. Over 100 million people world wide play this game on a regular basis.

In 1954 a wealthy Canadian couple went for a sail on their yacht. It was then that they were thinking of games that they wanted to play to pass the time in between ports. This game of Yahtzee, first called “The Yacht Game” was what came about from their many ideas of games to play. They simply started by playing themselves, and then wanting to make a few copies of the game for their friends. What they found though was that their friends told their friends who told their friends and everyone wanted a copy of this game. It was then that this couple decided to sell their exclusive production rights to Edwin S. Lowe in exchange for the first 1,000 copies to give out to people they knew.

When Edwin Lowe first got the game, the first thing he did was change the name for reasons that are still completely unknown. He changed this game to what is now known as Yahtzee. He immediately fell in love with the game and went about actively marketing his new product. One of the first things he did was to start organizing Yahtzee

parties to show off the new game and to show how exciting it can be when people get together and play it. It worked because almost immediately it increased the game's popularity dramatically just by word of mouth. It was in 1973 that he decided to sell his company, along with his rights to the Yahtzee game to Milton Bradley. Milton Bradley was a subsidiary to Hasbro Inc, one of the largest distributors and inventors of different games around the world.

Over the years, the Yahtzee game has grown to include several versions of the original game. These include Triple Yahtzee which is three games played at once, Painted Yahtzee which is where the die faces have different colors, Battle Yahtzee where players duel against each other, and Pyramid Yahtzee in which the square dice are replaced by tetrahedral dice. However, proving that this game still has the staying power that it has always had, the original Yahtzee game still remains the favorite among the consumers.

2.Rules of Yahtzee

2.1 Object of the game

The object of the game is a player to maximize his total score.

2.2 Gameplay

On each turn, a player gets up to three rolls of the dice. He or she can save any dice that are wanted to complete a combination and then re-roll the other dice. After the third roll, the player must find a place to put the score (though he or she can choose to end the turn and score after one or two rolls, if desired). If the resulting combination of dice will not fit in any unused scoring category, the player must place a

"zero" in one of the unused boxes. Each player's total score is calculated by summing all thirteen score boxes.

2.3 Scoring

The Yahtzee scorecard contains thirteen boxes divided between two sections: the upper section, and the lower section.

2.3.1 Upper section

In the upper section, each box is scored by summing the total number of dice faces matching that box. For example, if a player were to roll three "twos," the score would be recorded as 6 in the twos box. If a player scores a total of at least 63 points in these boxes, a bonus of 35

points is added to the upper section score.

Category	Description	Score
Ones	Any combination	Sum of all ones
Twos	Any combination	Sum of all twos
Threes	Any combination	Sum of all threes
Fours	Any combination	Sum of all fours
Fives	Any combination	Sum of all fives
Sixs	Any combination	Sum of all sixs

Fig.1: Categories of Upper section.

2.3.2 Lower section

The lower section contains a number of poker-themed combinations with specific point values:

Category	Description	Score
Three Of A Kind	At least three dice showing the same face	Sum of all dice
Four Of A Kind	At least four dice showing the same face	Sum of all dice
Full House	A three-of-a-kind and a pair	25
Small Straight	Four sequential dice (1-2-3-4, 2-3-4-5, or 3-4-5-6)	30
Large Straight	Five sequential dice (1-2-3-4-5 or 2-3-4-5-6)	40
Yahtzee	All five dice showing the same face	50 (First Yahtzee only)
Chance	Any combination	Sum of all dice

Fig.2: Categories of Lower section.

A certain combination can be scored in more than one appropriate category e.g, a full house can be scored in the Full House, Three-Of-A-Kind, or Chance categories.

2.4 Yahtzees chips and jokers

A Yahtzee occurs when all five dice have the same value during one roll. Yahtzee is the most difficult combination to throw in a game and has the high score of 50 points. If a player scores one or more additional Yahtzees during the same game, that player is awarded bonus points and is given bonus chips that correspond to each additional Yahtzee that a player rolls. Bonus Yahtzees are worth 100 points each. Bonus chips are only awarded for subsequent Yahtzees if the first Yahtzee was placed in the 50-point Yahtzee score box.

Successive Yahtzee can be used as jokers in the lower scores section, provided that the following criteria are satisfied: the *Yahtzee* category has been scored with zero or 50 and the corresponding category in the upper scores section has been filled. Then, the *Yahtzee* can be used as a joker to fill any lower scores category. The category is scored as normally. Thus, the Small Straight, Large Straight, and Full House categories will be scored 30, 40, and 25 points respectively. The 3 of a Kind, 4 of a Kind, and Chance categories will be scored with the total of the dice face.

3.Screenshots of Yahtzee

3.1 Start up

At the start up of the game the first roll is automatic.

While dice are rolling, some elements become inactive or unclickable. These elements are the toggle buttons of dice for holding it so as not to roll, the roll button and the buttons for scoring a category. An inactive element is transparent. Also, the text field “times of rolls” displays the number one, meaning that it is the first roll.



Fig.3: Start up.During the first roll of first round.

3.2 Play a Round

In the following screenshots, the user plays the first round of Yahtzee and scores a category in the third roll.A player can score a category in any of the three possible rolls of a round.

3.2.1 First Roll

When dice finish rolling, then the toggle buttons of dice, the roll button and the buttons for scoring a category become active or clickable. The active elements are not transparent.

The user has two options, to score a category clicking the button of his desired category, or not to score a category in the first roll but take a second roll clicking the roll button instead.

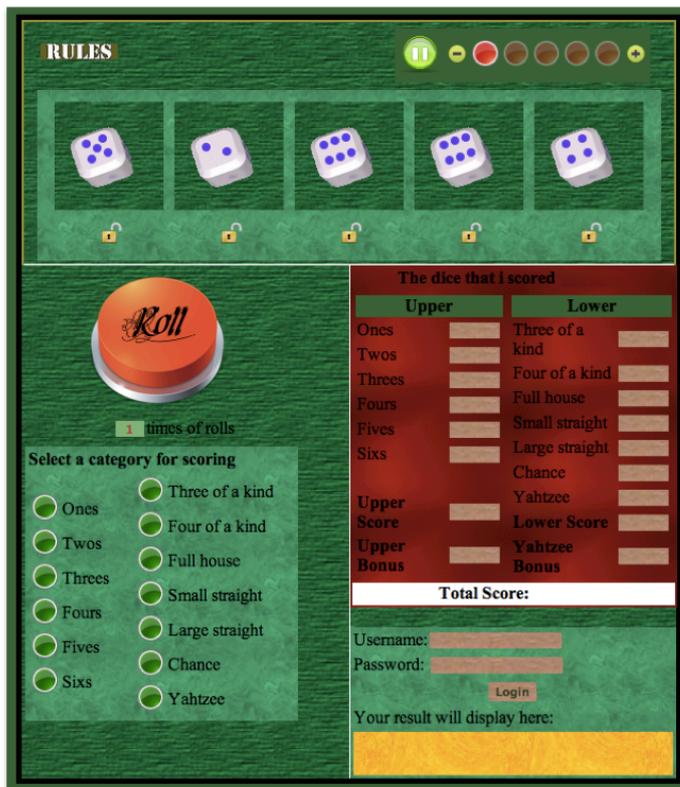


Fig.4: First roll of first round finished.

3.2.1.1 Choice of dice for a second roll

The user clicks the toggle buttons of dice that he wants not to reroll. When the button of a die is clicked, then it changes image showing a locked image and the background of die becomes red to indicate that this die will not reroll. Clicking again this button, the die can reroll. Then, its button takes the initial image showing an unlocked image and the background of this die takes its initial green background color.

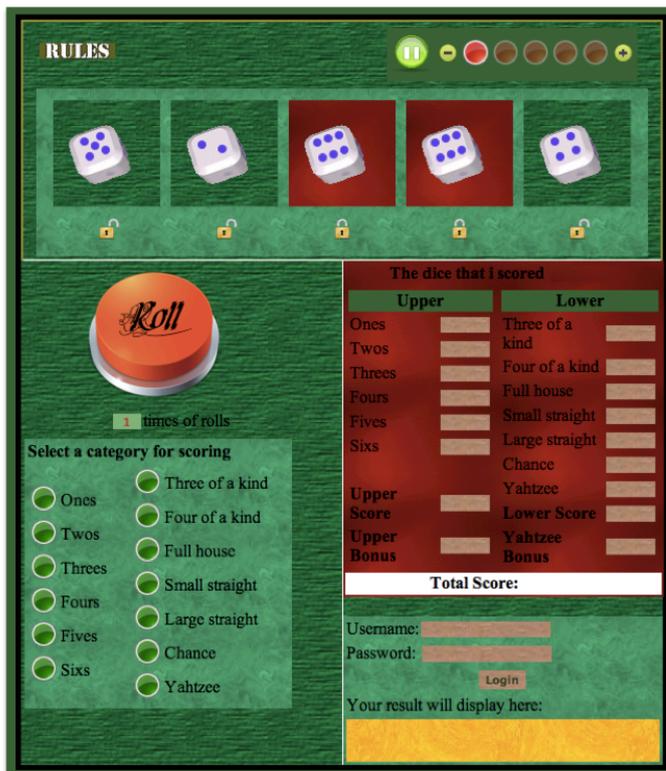


Fig.5: Choice of dice from user not to roll on the second roll. The user has chosen not to roll the two dice with value six.

3.2.2 Second Roll

When the user clicks the roll button to take a second roll, then the buttons of dice, the roll button and the buttons for scoring a category are deactivated. Also, the text field “times of rolls” displays the number two meaning that it is the second roll.

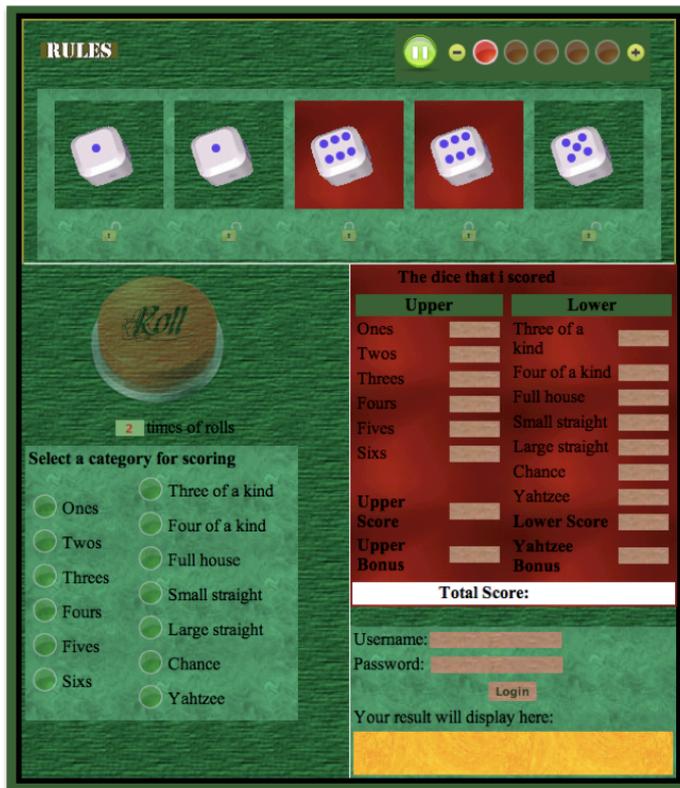


Fig.6: During second roll of first round.

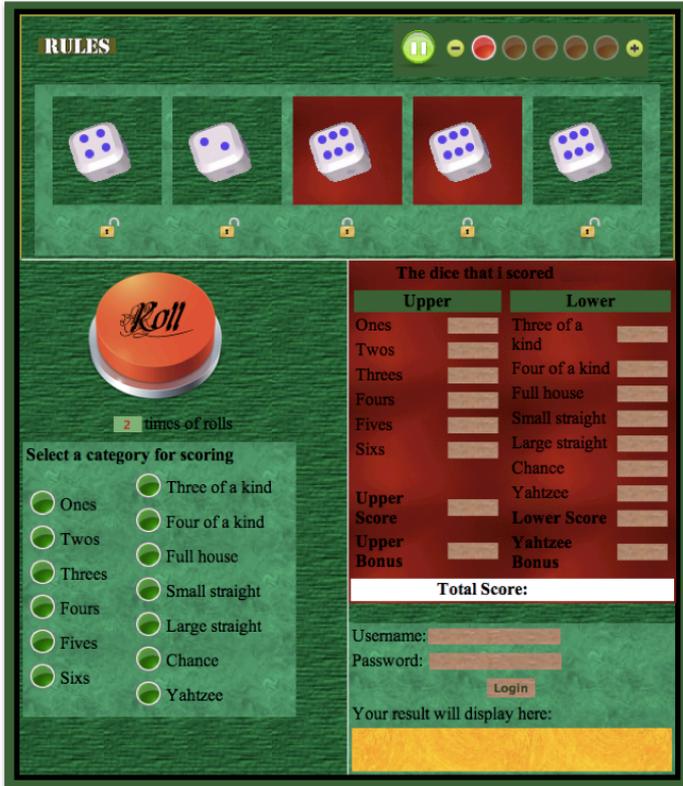


Fig.7: Second roll of first round finished.

3.2.2.1 Choice of dice for a third roll



Fig.8: Choice of dice from user not to roll on the third roll. The user has chosen not to roll the three dice with value six.

3.2.3 Third Roll



Fig.9: During third roll of first round.

When third roll finishes some elements become inactive. These elements are the roll button as each round has three possible rolls, and the buttons of dice.

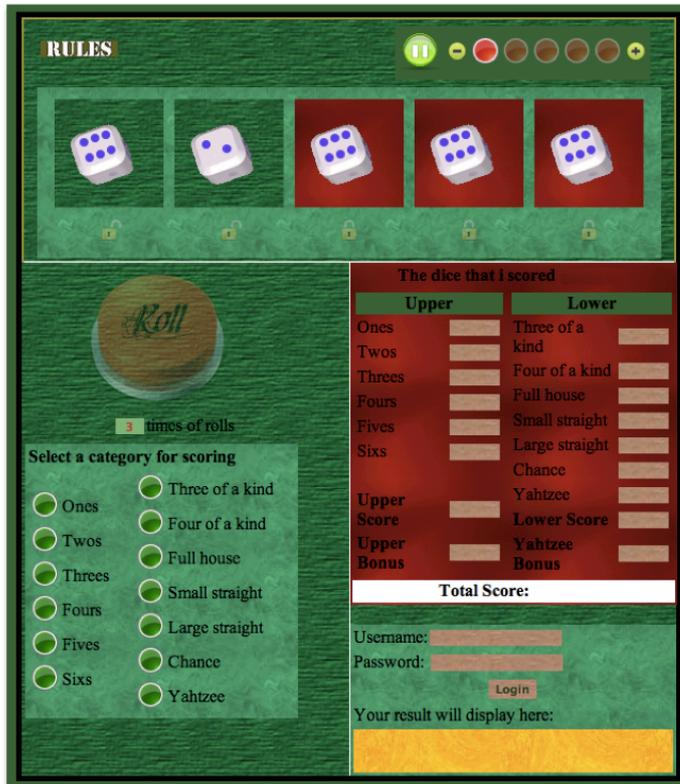


Fig.10: Third roll of first round finished.

3.2.3.1 Scoring a category

The user scores a category clicking the button of the category that he/she desires. Then, the selected button of the category changes color to red and the buttons of unscoring categories become transparent and inactive since in a round the user can score one category. Also, the text

field “The dice that I scored” displays the scoring dice. Moreover, the score of the selected category is written in the text field of this category. The text fields of upper score, upper bonus, lower score, yahtzee bonus and total score are updated depending on the scoring category. The first round is finished.

The roll button becomes clickable waiting for the user to click it to start the second round. The text field “times of rolls” displays the number zero since in a round the user has three possible rolls except the first round where the first roll is automatic.

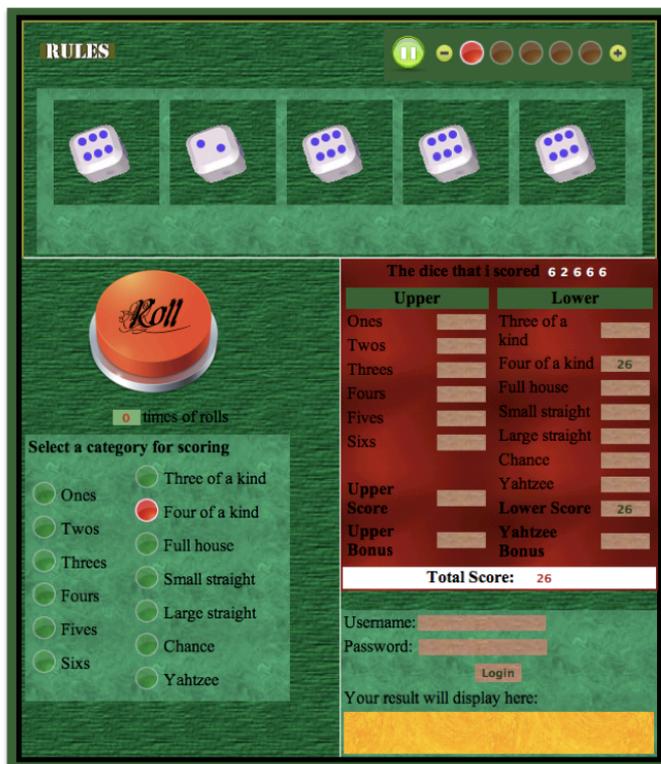


Fig 11: Scoring a category on the third roll. The user scores the category "Four of a kind".

3.3 Next Round

In this screenshot, the user plays the second round of Yahtzee.

Having already scored a category, the user clicks the roll button. The text field “times of rolls” displays the number one. At the start of each next round the text field “The dice that I scored” is cleared.

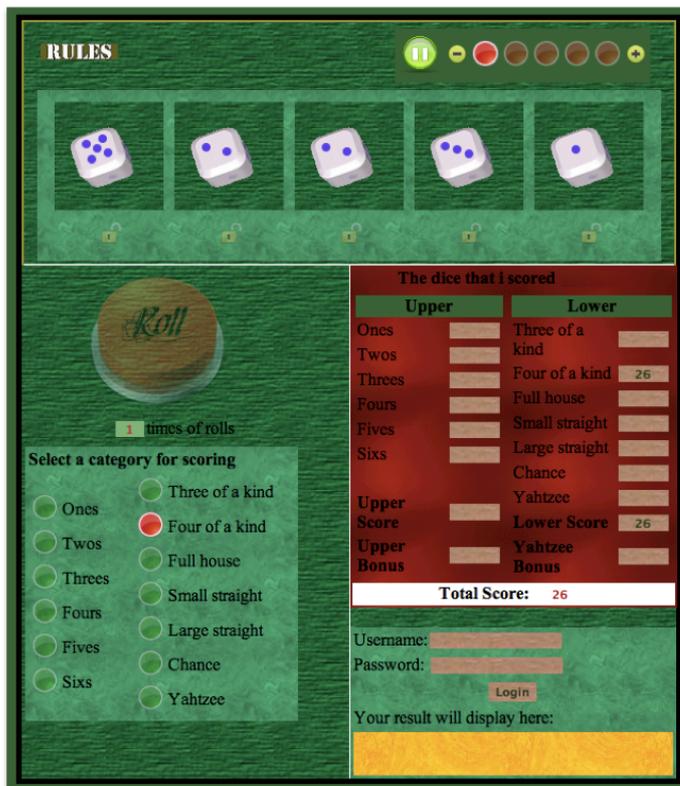


Fig.12: Next round. During first roll of second round.

3.4 End of Game

When the game finishes, a pop up-alert message is displayed and the user must click ok to continue.



Fig.13: End of game.

4. High Scores

4.1 Log in

The player must be a registered one to save his/her highscore and update it if he/she has a new highscore. He must enter one of the following valid combinations of username and password.

player	username	password
1	user1	abcde
2	user2	bcdef
3	user3	cdefg
4	user4	defgh
5	user5	efghi

Fig.14: Registered players.



Fig.15: No registered player can be with username "user1 1".

4.1.1 During the game

The player can log in during the game to view his highscore and the highscore of game. So, he can try to override his highscore and why not even the highscore of game!



Fig 16: The player user1 is logged in.

At the end of the game, if his total score is higher than his highscore, then he can click on the save button to update his highscore.

If his total score is lower than his highscore and he clicks on the save button, the highscore does not change.



Fig.17: Highscore of user1 is updated. Also highscore of game is updated as the highscore of user1 becomes the highscore of game.

4.1.2 At the end of the game

The player can log in at the end of game.

His highscore is updated automatically, if his total score is higher than his highscore. If his total score is lower than his highscore, then the highscore of the player does not change.

5.Sound

5.1 Music Player

5.1.1 Basic Player functions

The music played from the music player starts automatically.

Clicking the pause button, the music is paused. Clicking the play button, the music is resumed meaning that it continues from the previous paused state.



Fig.18: "Pause" button. Fig.19: "Play" button.

When the music finishes, it starts from the beginning automatically.

5.1.2 Adjusting the volume

The plus and minus buttons can be used to adjust the volume of the sound. When the plus button is clicked, the volume increases. When the minus button is clicked, the volume decreases.

The red circle images between the minus and plus buttons indicate the volume. When the red circle image is transparent, the corresponding volume level is not active. When the red image is not transparent, the corresponding volume level is active.

The volume level is 0% (no sound whatsoever) when all the red circle images are transparent. The volume level is 100% (maximum volume) when all the red circle images are not transparent. The volume level is 20% when the first red circle image (right to the minus button) is not

transparent. The volume level is 40% when the two first red circles are not transparent. The volume level is 60% when the three red images are not transparent and the volume level is 80% when the four red images are not transparent.

Each time the plus button is clicked, the volume increases 20% and the next red circle from the previous that is not transparent, becomes not transparent. In the same way, by clicking the minus button the volume level decreases 20% and the last red image that is not transparent becomes transparent.



Fig.20: The volume level is 20%.

5.2 Sounds of Yahtzee

5.2.1 Background music

The background music can be controlled by the music player using the functions of it. The background music starts playing automatically according to the functions of the music player.

5.2.2 Other sounds

The other sounds of Yahtzee can be played independently from the background music, meaning that when these sounds are played, the background music is not interrupted if, of course, the background music is not paused. While dice are rolling, a rolling sound is

heard. The rolling sound stops when the dice finish rolling. When the player scores a category, by clicking the button of the category that he wants to score, a clicking sound is heard meaning that this category is scored.

6. Play Yahtzee

6.1 On the Desktop

A user can play Yahtzee on his desktop. He only needs a web browser of his choice to play Yahtzee and of course the game.

If the user uses Windows operating system, he must double-click on the yahtzee.exe file and open from the extracted folder named "Yahtzee" the file "yahtzee.html" in a web browser.

If the user uses Mac operating system, he must double-click on the file "yahtzee.dmg" and open from the volume " Yahtzee" that is mounted, the file "yahtzee.html". Then, he can eject the volume "Yahtzee" making right-click on this volume and select "Eject".

So, whenever the Mac user wants to play the game, double-click on

the "yahtzee.dmg " file is needed.

When the user plays Desktop Yahzee cannot play as a registered user and save his score.

6.2 On the Web

The Yahtzee game "lives" or exists in a web server.

6.2.1 Yahtzee with no high scores

The web server that "lives" Yahtzee has not a database that will be needed for storing information concerning the players and saving their highscore. So, the user cannot play as a registered user and save his highscore.

Also, there is the case the Yahtzee game to "live" in a web server with database possibilities but Yahtzee has not been developed with the high scores feature.

6.2.2 Yahtzee with high scores

The web server that "lives" Yahtzee has database possibilities and the game has been developed with the high scores feature.

The player can log in as a registered user with a valid combination of username and password, having so the possibility to save his highscore and update it if he has a higher score.

7.Yahtzee on Mobile Devices

7.1 Installation

The user can play the Yahtzee game on a mobile device "loading" or transferring the required file of Yahtzee on the device.

The required file of Yahtzee depends on the operating system of the mobile device that Yahtzee will be played.

The user can transfer this file via bluetooth or download it from a web location or send it through email. After transferring the file, the user must open it from the device and Yahtzee game will be installed. Finally, the user can find Yahtzee in the applications folder of the device and play it. The game installed on the applications folder has an icon that indicates Yahtzee.

7.2 Mobile Devices

7.2.1 iOS

The user can play the Yahtzee game on an Apple iOS device.

Apple iOS devices are iPhone, iPad and iTouch.

The required file of Yahtzee that must be installed on such a device is called Yahtzee.ipa.

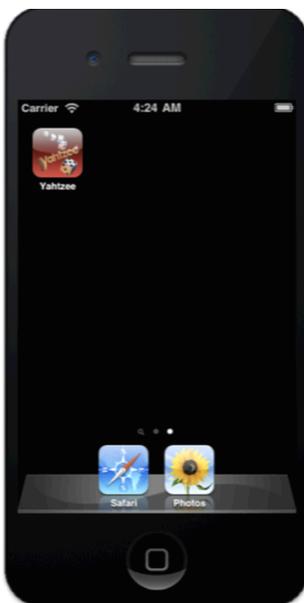


Fig.21: Yahtzee on iPhone. The user must click on the Yahtzee icon (shown on the iPhone screen above) to open the game.



Fig.22: Yahtzee on iPhone. The user has opened the Yahtzee game.



Fig.23: Yahtzee on iPad. The user must click on the Yahtzee icon (shown on the iPad screen above) to open the game.

7.2.2 Symbian

The user can play the Yahtzee game on a Symbian device S60 or S80 or S90 or UIQ platform. The required file of Yahtzee that must be installed on such a device is called Yahtzee.wgz.

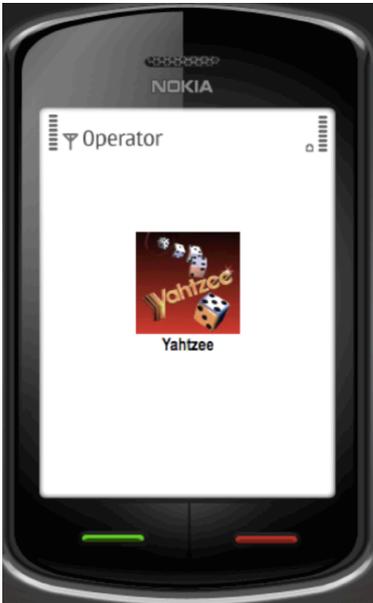


Fig.24: Yahtzee on a Symbian device. The user must click on the Yahtzee icon (shown on the Symbian screen above) to open the game.



Fig.25: Yahtzee on a Symbian device. The user has opened the Yahtzee game.

7.2.3 Android

The user can play the Yahtzee game on an Android device. The required file of Yahtzee that must be installed on such a device is called Yahtzee.apk.

7.2.4 webOS

The user can play the Yahtzee game on a webOS device. The required file of Yahtzee that must be installed on such a device is called Yahtzee.ipk.

7.2.5 BlackBerry

The user can play the Yahtzee game on a BlackBerry device. The required file of Yahtzee that must be installed on such a device is called Yahtzee.ota.

8. Technical Development Notes

8.1 Development Tools

The machine in which Yahtzee was developed, was an Intel-based computer Mac OS X Snow Leopard Version 10.6.6.

The IDE in which Yahtzee was built, was Aptana Studio 2. The executable file yahtzee.exe was created with iexpress.exe which is found in all Windows OS. The file yahtzee.dmg was created with Disk Utility, an application found in Mac OS.

8.2 Programming Tools

The HTML web page uses an external stylesheet CSS which formats the web page.

8.2.1 Client-Side scripting

Client side scripts are executed on the client computer by the Web browser. The process with client-side scripting is the following: the user requests a web page from the server, the server finds the page and sends it to the user and the page is displayed on the browser with any scripts running during or after display.

Javascript is a client-side scripting language. It is used to build Yahtzee. When a player scores a category, the javascript function of this category is executed and the player's score is displayed on the corresponding text-field. When the game ends, all the javascript functions of categories have been executed. During the game some extra javascript functions are executed automatically to check if the player can take a bonus.

AJAX is the art of exchanging data with a server, and update parts of a web page - without reloading the whole page. Ajax code is executed on the web browser. The keystone of AJAX is the XMLHttpRequest object. All modern browsers support the XMLHttpRequest object. The XMLHttpRequest object is used to exchange data with a server behind the scenes. Ajax is used in the part of login of the players's Yahtzee.

8.2.2 Server-Side scripting

Server side scripts are executed on the server and the results are sent to the client. **PHP** is a server-side scripting language. It is used to build in Yahtzee the part of login of the players. The php server file has access to a **MySQL** database and sends a result to the player.

8.3 Explanation of the Roll of Dice

There are six images for representing the dice numbers. The image "dice1.gif" represents the die with number one, the image "dice2.gif" represents the die with number two, and so on..

The method `setTimeout()` is executed, which executes some code after a specified time-interval.

```
setTimeout("javascript statement",milliseconds);
```

❑ *javascript statement*: URL of the image of dice =
path_of_dice+"dice" + number() + ".gif"

The created function `number()` returns a random number between 1 to 6.

❑ *milliseconds*: 25ms

The function `setTimeout()` method is executed repeatedly for a specific time. This time is set to 2000ms(2s).

So, the images of dice change each 25ms for a time of 2000ms.

8.4 Explanation of the Login part

The Ajax Technology is used.

8.4.1 Web Page

When a player clicks on the login button then a javascript function is executed. This function initially creates an XMLHttpRequest object and also a function is called to be executed when the server's response is ready. In the function that is executed when the server's response is ready, the part that displays the message to the player loads the server's response.

```
xmlhttp.onreadystatechange=function()
{
if (xmlhttp.readyState==4 && xmlhttp.status==200)
{
document.getElementById("myDiv").innerHTML=xmlhttp.responseText;
}
}
```

Properties of the XMLHttpRequest object and description:

- ❑ `onreadystatechange`: Stores a function (or the name of a function) to be called automatically each time the `readyState` property changes
- ❑ `readyState`: Holds the status of the XMLHttpRequest. Changes from 0 to 4:
 - 0: request not initialized
 - 1: server connection established
 - 2: request received
 - 3: processing request
 - 4: request finished and response is ready
- ❑ `status`: 200:"OK" and 404: Page not found
- ❑ `responseText`: To get the response from a server.

Finally, in the javascript function that is executed by clicking the login button a request is sent off to the php file on the server. Some parameters are added to the url (php file) that the request is sent. The parameters are the username and the password that the player typed and the score of the game when it has finished.

Methods of the XMLHttpRequest object and description:

- ❑ `open(method,url,async)`: Specifies the type of request, the URL, and if the request should be handled asynchronously or not.

method: the type of request: GET or POST

url: the location of the file on the server

async: true (asynchronous) or false (synchronous)

- ❑ `send(string)`: Sends the request off to the server.

string: Only used for POST requests

8.4.2 Web Server Installation

A server with PHP and MySQL features is used for the section of login of users. The local machine-localhost(ip:127.0.0.1) becomes a server with PHP and MySQL features. MAMP is installed on the machine. The abbreviation "MAMP" stands for: Macintosh, Apache, MySQL and PHP. MAMP installs a local server environment on the Mac OS X computer.

Included programs & libraries in MAMP used

- Apache 2.0.63
- MySQL 5.1.44
- PHP 5.2.13 & 5.3.2
- phpMyAdmin 3.2.5

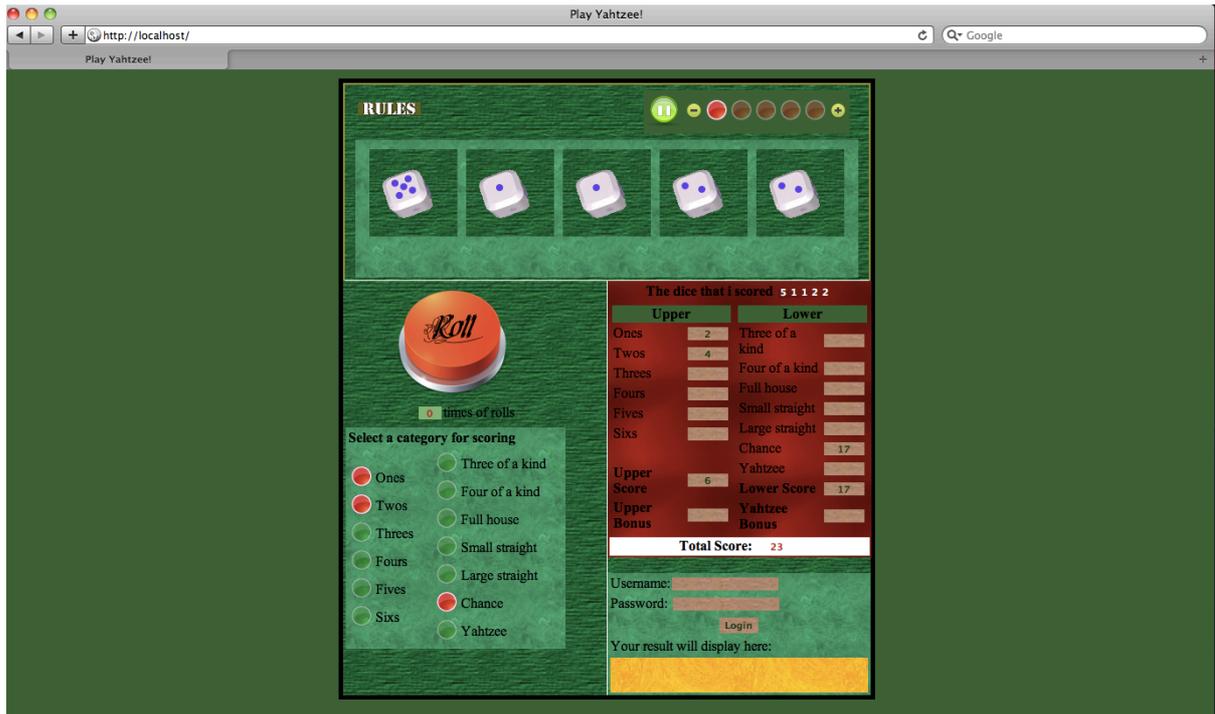


Fig.26: The URL is "http://localhost".The displayed web page of Yahtzee is called index.html.

8.4.3 Database and Table Creation

phpMyAdmin is used.phpMyAdmin is an open source tool written in PHP intended to handle the administration of MySQL with the use of a Browser.It can perform various tasks such as creating, modifying or deleting databases, tables, fields or rows executing SQL statements, or managing users and permissions.

Initially, a MySQL database is created, in which later, a MySQL table for the registered users is created. The table of registered users has the fields username, password and highscore. In the table, five records(rows)--that means five users have been inserted.

id	username	password	highscore
1	user1	abcde	0
2	user2	bcdef	0
3	user3	cdefg	0
4	user4	defgh	0
5	user5	efghi	0

Fig.27: Table in Database.

A registered user is identified by a valid combination of username and password. The field highscore is used to save the highscore of each registered user. The initial value of highscore is zero for all the users.

8.4.4 Server Page

The page on the server called by the JavaScript onclick event on the login button, is a PHP file. The source code in the php file is connected to a database, has access to the data of the registered users and returns a response-display message to the browser-player.

8.4.4.1 Connection to Database

The MySQL database is used with PHP.

To have access data to the database, a connection to the MySQL

Server that "lives" the database must be created first. In PHP, this is done with the `mysql_connect()` function.

```
mysql_connect(servername,username,password);
```

servername: Specifies the server to connect to.

username: Specifies the username to log in with.

password: Specifies the password to log in with.

On Yahtzee the parameter `servername` has value "localhost", the parameter `username` has value "root" and the parameter `password` has value "root". The values of `username` and `password` can be changed through phpMyAdmin.

Next, the database must be selected. In PHP, the database is selected with the `mysql_select_db()` function.

```
mysql_select_db(database_name);
```

8.4.4.2 Access Data of Database

The *select* statement is used to select data from a database table.

On Yahtzee, `select` statement is used first to test if a player is a registered user--that means with a valid combination of `username` and `password`. If the player is a registered user, then `select` statement is used to read the highscore of users. The highscore of the game--means the

maximum highscore of all the registered users can be accessed by reading all the highscores of users and comparing them to find the maximum highscore of them.

The *update* statement is used to modify data in a database table.

On Yahtzee, update statement is used to update the highscore of the registered users only if they have a higher score. So, the highscore of a registered user is read from the database table and it is compared with his score in a Yahtzee game.

8.4.4.3 Server Response

The php `echo()` 'function' is used and the response is sent to the placeholder that displays a message to the player. The `echo()` function generally outputs one or more strings.

8.5 Sound

8.5.1 *SoundManager 2(SM2)*

SoundManager 2(SM2) is a JavaScript Sound API for the web. It supports MP3, MPEG4 and HTML5 audio. It is used to play the sounds of Yahtzee.

8.5.2 *SM2 Configuration*

The file `soundmanager2.js` (in the downloaded SM2 folder) is included on Yahtzee.

```
<script type="text/javascript" src="/path/to/soundmanager2.js"></script>
```

Also, SM2 needs to know where to find the flash .SWF files (in the downloaded SM2 folder).

```
soundManager.url = '/path/to/swf-files/'
```

8.5.3 SM2 Methods used

❑ **object:SMSound createSound** (object:options)

Creates a sound with an arbitrary number of optional arguments.

Returns a SMSound object instance.

Requires id and url at a minimum.

```
Example:    soundManager.createSound({  
            id: 'mySound', // required  
            url: '/audio/mysoundfile.mp3' // required  
        });
```

❑ `object:SMSound play(id:string, [options object])`

Starts playing the sound specified by ID. Returns an SMSound (sound object) instance.

Example: `soundManager.play('mySound');`

❑ `object:SMSound stop(id:string)`

Example: `soundManager.stop('mySound');`

Stops playing the sound specified by ID. Returns the related sound object.

❑ `object:SMSound togglePause(id:string)`

Pauses/resumes play on the sound by ID. Returns the related sound object.

Example: `soundManager.togglePause('mySound');`

It is called when the play or paused button of music player is clicked on.

❑ **object:SMSound setVolume(id:string, volume:integer)**

Sets the volume of the sound specified by ID and returns the related sound object.

Accepted values: 0-100. Affects volume property.

Example: `soundManager.setVolume('mySound',50);`

It is called when the plus or minus button of music player is clicked on, for adjusting the volume.

8.5.4 SM2 Events used

❑ **onload(boolean:success)**

Fires on sound load. Boolean reflects successful load (true), or fail/load from cache (false).

❑ **onfinish()**

Fires when a playing sound has reached its end.

When background sound has reached its end, onfinish() event is fired and soundManager.play() method is called. So, background music is looped.

8.6 Yahtzee on Mobile Devices

8.6.1 Phonegap

PhoneGap is used to build Yahtzee as a mobile application. PhoneGap is a standards-based, open-source development framework for building cross-platform mobile apps with HTML, CSS and JavaScript for iPhone/iPad, Google Android, Palm, Symbian, BlackBerry, Windows Mobile and more.

8.6.2 Phonegap Build

It takes the pain out of compiling mobile apps for multiple platforms forgetting SDKs, compilers and hardware that are used without PhoneGap Build. An app using HTML, CSS or JavaScript can be uploaded to the PhoneGap Build service and cross-platform mobile apps are ready to be downloaded and used on mobile devices.

8.6.3 Deploy to Simulator-Requirements

Initially, PhoneGap is installed.

Symbian Simulator

Yahzee is deployed to a Symbian Simulator. For Mac operating system, in which Yahzee is developed, Aptana Studio and Nokia WRT Plug-in for Aptana Studio are required. This plug-in has a browser-based javascript emulator. The file yahzee.wgz is loaded into the emulator.

iOS Simulator

Yahzee is deployed to an iOS Simulator. Intel-based computer with Mac OS X Snow Leopard (10.6) is required. iOS SDKs and Xcode IDE are installed. Xcode has an iOS simulator.

8.6.4 Mobile Screen Detection

The images of the dice are resized to fit to the mobile screen. The "Screen Object", which is a browser object, is used. The "Screen Object" contains information about the visitor's screen. The property "width" of the screen object is used, which returns the total width of the screen. So, the image of each of the five dice is resized to have width equals to "screen.width/6".

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