

# Online Lottery Purchasing & Automatic Results Checking System

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**Abstract**— Lotteries are used to raise money by selling numbered tickets and giving prizes to the holders of numbers drawn at random. This report describes the design and implementation details of a lottery purchasing and automatic results checking system. The main functionalities of this system are purchasing lotteries according to buyer's desire through internet and ability to check results automatically of a lottery which is or is not purchased through internet. Both web based application and an android application have been development for the ease of users. The system protects the privacy of the users. Any person who wishes to use lottery can use this system easily.

**Keywords**— *Web crawling; Web scraping; Android; Lottery*

## I. INTRODUCTION

People tend to buy lotteries with the hope of obtaining some extra money through lotteries with this hard economic environment despite of their busy life style. New lotteries come to the market with targeting more buyers and making them more interesting towards buying lotteries. In order to check those lottery results, buyer can either watch the drawing event while it is being telecasted or wait until following day and go to a lottery booth /check newspaper to get tickets checked.

Because of the busy life style that people have used to, they do not want to spend much time on waiting until lottery draw is being telecasted or they might not be able to go to another lottery seller and get their results checked. Because of that, people forget to check the lottery results. There is a chance of customer being cheated by lottery seller. People might not be able to go to lottery booths to buy lotteries even if they want to buy lotteries. The need of an application which is cable of purchasing lottery and checking results automatically can be seen to address these issues.

This application, OLPARC, helps to purchase lotteries online and check results of lotteries automatically of any lottery. The purpose of this system is to increase the number of lottery buyers using online purchasing and reduce the chances of being cheated or mistakes by automating results checking process.

With the use of this application, a user may not forget to check the lottery results since user can enter lottery details to the application as soon as user buys lottery. Then the system will automatically check the results and will let the user know about the winning status once the results have been published. This helps the users to stop being cheated and stop making mistakes when checking results. OLPARC is web based application as well as an android application which has been implemented with the purpose of increasing the lottery buyers and avoid lottery buyers being cheated or mistaken.

OLPARC provides a separate account for an each user which shows the history of the purchased tickets and tickets which are to be checked and which can be accessed by anywhere through log in using username and password. Once user entered the numbers of the lottery to be checked, it will get the relevant details from the relevant lottery board web site and compare it with user's numbers and give the winning amount as the output.

The paper is structured as follows: Section II discusses related literature including existing similar lottery applications. Section III describes the requirements and design aspects of the OLPARC application. The implementation considerations, algorithms, materials and Graphical User Interfaces (GUIs) explain in Section IV. Section V states the testing and analysis of the system and Section VI concludes the paper stating future possible extensions for the system.

## II. LITERATURE REVIEW

A wide variety of software systems are available that facilitate lottery related activities [1, 2, 3, 4, 5]. Among them the work done in [1] presented functionalities such as lottery buyer can purchase lottery through internet. In this system [1] it is difficult to replicate the same lottery. Another interesting work is described in [1] providing the privacy for the users of the system such as not exposing details of the winner. User can claim for the lottery again in case of misplacing since the system contains the details of buyers.

NSW Lotteries [2] and Lottery West [3] are some of the available online websites which support games of chances. These systems support various functionalities such as buying lottery online, view results and claim rewards. User can select the winning numbers of a draw in both of these web applications.

But the Lottery West [3] application shows the results of a draw in television and in the website. User has to go there and check the results manually.

In NSW Lotteries [2] the site shows the winning ticket numbers of the jackpot and other major prizes. But they do not inform the user about winning status. Buyer has to go to the website and check it for him/her self.

LK Lottery [4] is mobile application for Sri Lankan lottery which facilitate the user with the capability of viewing results of a draw of any lottery in both National Lottery Board (NLB) and Development Lottery Board (DLB) using this application.

NLB-SL [5] is another mobile application which provides the facility to view results of lotteries of National Lottery Board in Sri Lanka.

In the system described in this report we consider the ability of user to purchase lotteries through internet with facilitating the flexibility to selecting the numbers of a lottery according to user's desire and the functionality of checking results automatically after user entering the details of the lottery to the system as the main functionalities of this system. The system is implemented as a web application and an android application. Buyer can select any lottery of either National Lottery Board or Development Lottery Board to check results automatically.

Web crawling is used to get the results of a corresponding draw from the website of the corresponding lottery holder. The lottery results are checked synchronously with the lottery boards' websites and the user is informed with the winning amount automatically if the results have been published.

### III. SYSTEM MODELS

#### A. System Requirements

The main functional requirements of the system OLPARC were that user would be able create an account by registering with the system and he would be able log into the system and purchase lotteries and add lottery details to check lottery results automatically. User should be also able to edit the profile, delete his/her lottery history.

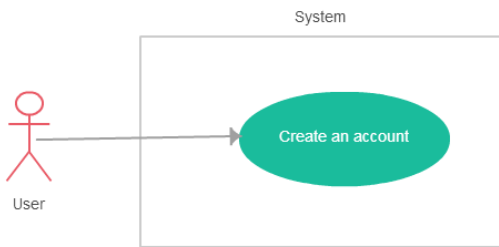


Fig. 1. Use case diagram of creating account

As non-functional requirement, security is expected to be implemented in the application since the system contains users' information and include transactions since it involves online purchasing lotteries. For that purpose two way authentication method has been used. Performance is an essential part of the application since, it is needed to load history, results and other details within a fraction of seconds since user might begin to have negative impression towards the system if it is taking too much time.

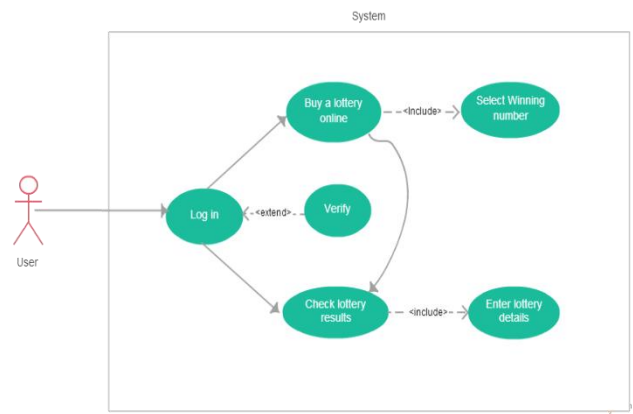


Fig. 2. Use case diagram of the lottery management system

Consider the usecase shown in Fig. 1. If a new user is trying to use the application, he needs to create an account. There, he/she has to enter her details to make the account. As shown in Fig. 2, user logs in to the system after verifying the logging details, he/she should be able to buy a lottery. In that process, he/she can choose own winning numbers. Then it is automatically added for checking results. If the user has purchased lotteries without using the system and yet he wants to use automatic results checking facility, user can enter those details of the lottery.

#### B. System Design

The OLPARC system has a web application and a mobile (android) application to inspire more users to use the application. Both the web application and mobile application use the three tier architecture.

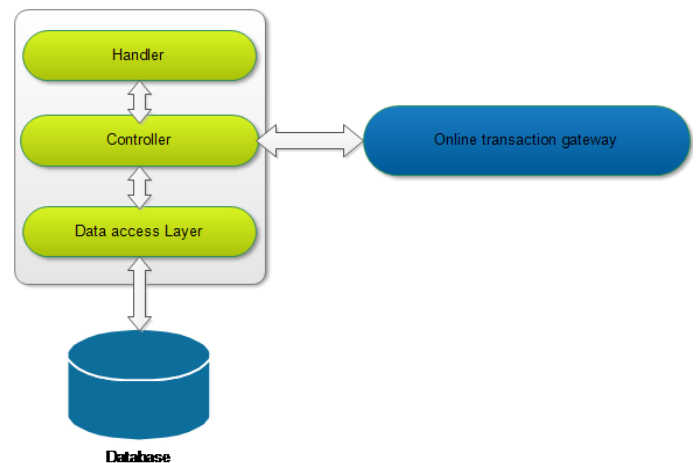


Fig. 3. Architecture of the system ( Three tier architecture)

Using three tier architecture which is shown in Fig. 3, makes easier to improve the maintainability and easier to do further developments. Handler class contains the GUI part of the system while controller layer contains the business logic of the OLPARC application.

Database access layer contains all the files which do the transactions with the database. This provides the flexibility to make improvements in the backend without doing any

differences in above layers. Likewise every layer can be subjected to modifications without affecting to any other layer. Activity diagrams related to the OLPARC system are shown in Fig. 4 and Fig. 5.

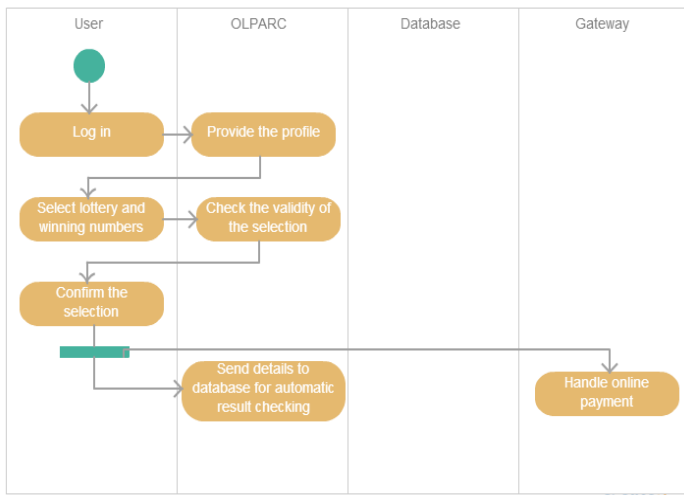


Fig. 4. Activity diagram for online lottery purchase)

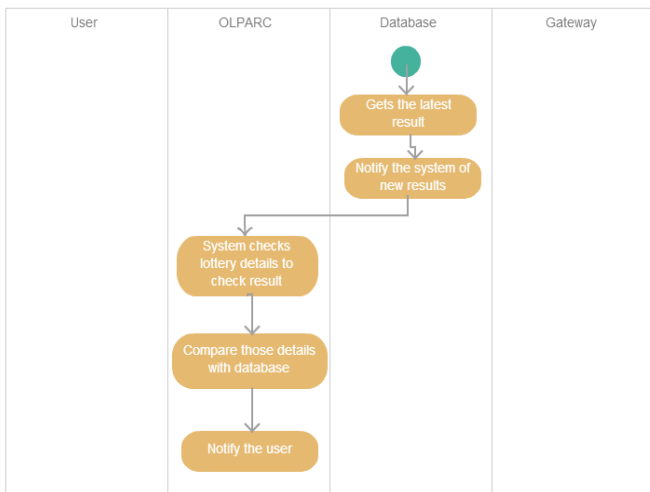


Fig. 5. Activity diagram for automatic result checking

When a user logs into the system, it will provide the user his profile details including history. He/she can enter the lottery details that he is claiming to check results and those details are checked to verify whether they are valid details. Then those details are added to the database to check the results.

When the new results are issued, the system synchronously checks with the lottery board’s website with user entered details and notify the user about the winning status.

### C. Database Design

User Details table contains all the details of the users while lottery details table contains the details about the lottery such as

whether a letter is occupied in the lottery, how many numbers are available at the lottery etc. Results table contains details of the users’ lottery results.

**LotteryId** from **Lottery Details** table is acting as a foreign key in the table name “**Results**” while **UserId** from **User Details** table is also acting as a foreign key in **Results** table.

By making LotteryId and UserId as foreign keys in Results table, we can easily get the complete set of details of a result. **Numbers** in “Results” table is type of VARCHAR, because the numbers are stores in the database as a single string with separating “.”.

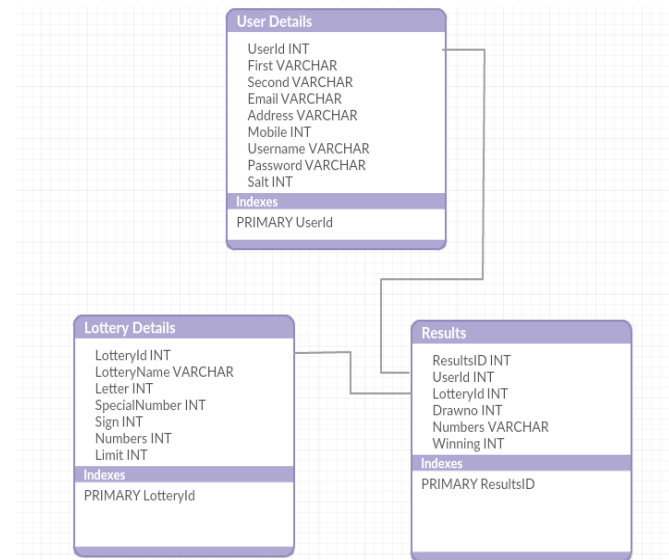


Fig. 6. Database schema of the OLPARC system

## IV. SYSTEM IMPLEMENTATION

### A. Implementation Procedure

Since OLPARC system has both web application and a mobile application the need of lot of tools and techniques were essential.

Talking about the tools behind the OLPARC web application, the text editor to build the website was “**Sublime Text**”. As technologies used in developing web application HTML and CSS were essential in developing the website while JavaScript, JQuery also acted as a major part to improve the functionalities and the user friendliness in the webpage., php was used as the scripting language to connect the website with the database and the database was managed by using **phpMyadmin**. For making the elements in webpages more attractive, bootstrap was used as a resource. To change the webpage’s details dynamically according to selected details (Eg: Number of text fields according to the selected lotteries), Ajax was used since it provides a better solution for that.

When consider the OLPARC android application, as the IDE for the development process, Eclipse was used with **Android Development Tool**. To make an http connection, a class using JSON were developed since the android application needs to load data from an online database. Java plays a major role in

android application development process with making http connection and helping to achieve a better GUI. As the resources in the development process of the android application, **stackoverflow** forums were helpful in solving the occurred problems.

In both web application and android application, the user entering winning numbers are taken into the database as a single string for the ease of results checking purpose. And the lottery board's results of the corresponding lotteries were taken as a single string to compare with the user entered numbers. This procedure reduces the complexity in comparing results and the complexity in storing results in the database.

Since different lotteries have different properties such as different amount of numbers, bonus number, letter etc, it would be complex when it comes to storing those numbers in a database as an individual values. Making them as a single string and store in the database reduces the complexity of that issue and makes it easier to check results.

When taking actual lottery results from lottery board site, the post data has to be found which are sent to the web page in order to get the proper lottery results. By going to the web page and pressing f12 would give the post data of that web page. Using that method, the needed data to be sent to the lottery board's site can be recognized. According to those data, each lottery is referred in the web site with a specific ID. Those IDs have been included in the database and those ID is sent along with the corresponding draw details to extract the winning numbers from the site.

After sending that data, as the result an html page with a table containing results is given. Recognizing the elements in the HTML page, the needed data can be grabbed. Likewise we can get any data relevant to OLPARC system.

### B. Materials

The main data that is needed in OLPARC system are details about lotteries and the winning numbers and winning procedure of the lotteries. Visiting lottery board's web site, the relevant details of the lotteries can be taken including winning procedure and winning numbers with jackpot. The result that is received through html page is summed up to a single string to make easier to store in the database.

Lottery details needs to post data is taken from the web page and stored in the database as lotteryId in database table called "Lottery Details". After analyzing the wining procedure of each and every lottery mentioned in the lottery board's website, algorithms to check the wining amount have been created.

### C. Algorithms

In the OLPARC system, a more weight has been given to the automatic results checking part. All the possibilities according each and every lottery have to be analyzed to prepare the algorithms to implement results checking part more accurately. Fig. 7, gives the pseudocode for the result checking algorithm.

In some lotteries, the forward order matching pattern and backward order matching pattern both has to be considered to obtain the maximum winning amount. A variable called maximum is maintained in every results checking algorithm to obtain the maximum amount.

When selecting lottery details, only lottery id is taken to get other details from the database. Database returns a json object and according to the details of the json object, the numbers of fields to input data are created in UI.

```

Max = 0
Winning_amount =0
for ( i = 0 to i = 5)
// checking forward winning order
    Winning_amount= corresponding amount according
to number matches
    if winning amount is greater than current
maximum,
        maximum = winning_amount
for ( i = 5 to i = 0) //
checking backward winning order
    Winning_amount= corresponding amount according
to number matches
    if winning amount is greater than current
maximum,
        maximum = winning_amount
return maximum
    
```

Fig. 7. Pseudocode for result checking

### D. Main interface

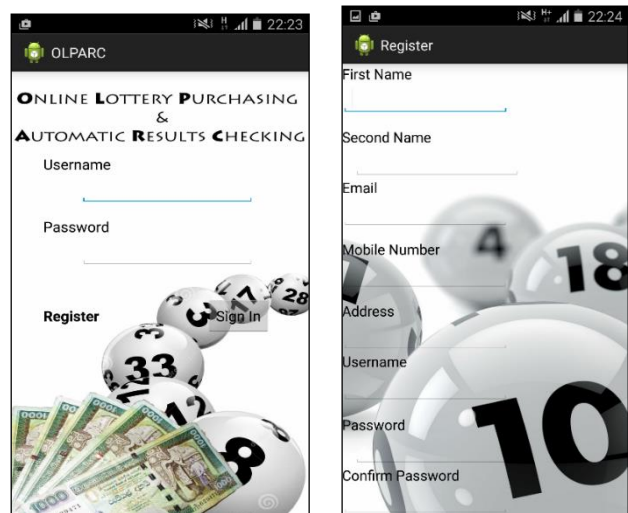


Fig. 8. Login and Register user interfaces of android application

The login and user registration user interfaces are shown in Fig. 8. The interface shown in Fig. 9 (left side) shows the main menu of the application which is simple and easy to for the user to navigate in the application. Fig. 9 (right side) shows the user interface for lottery results checking. After selecting the lottery from the drop down box, winning number layout will be adjusted according to the details of the selected lottery. It will show the history of the user checked lotteries and their status.

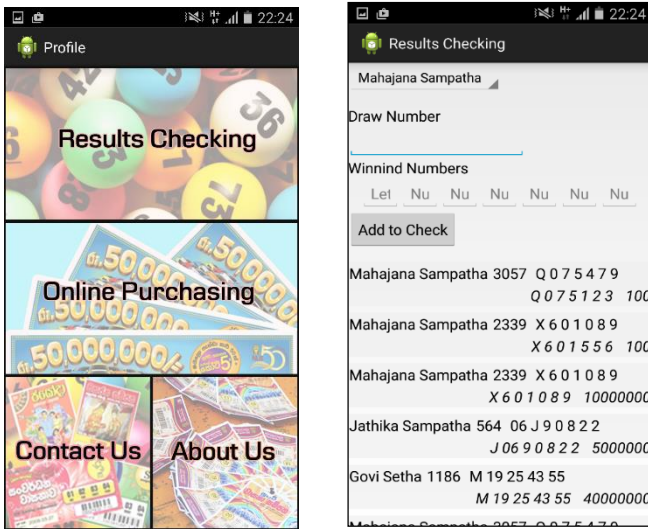


Fig. 9. Main menu and Results checking interfaces of android application

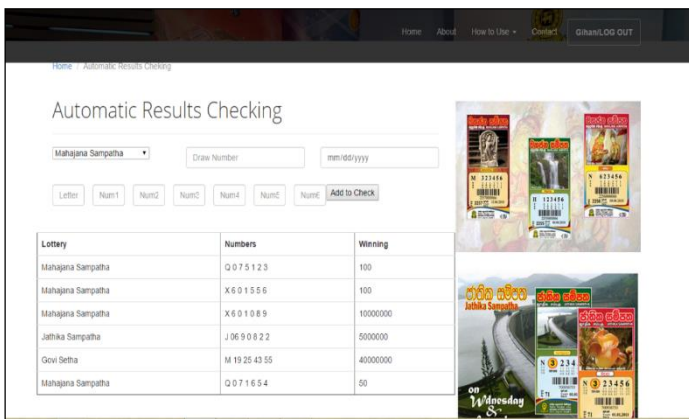


Fig. 10. Interfaces of web application

Fig. 10, shows the results checking interface of the web application. Once the user chose the lottery name, the fields will be dynamically adjusted according the lottery's properties.

## V. SYSTEM TESTING AND ANALYSIS

### A. Testing Approach

Since OLPARC has an android application, we can use **Robotium** [6] testing process to do the testing in android application. By using **Robotium** GUI testing, we can make sure that the GUI part of the android application works according to our expected level. Such as giving notification for wrong inputs, navigate through windows without causing errors etc.

**Selenium** automation testing [7] was used to test the OLPARC web application. Using eclipse we can do Selenium automation testing to verify that the web pages are behaving as we expected and give the proper outputs as results.

### B. Aspects related to performance, security, failures

When consider the security, two way authentication has been implemented to verify the user entering data is true. When user registers in the system, a code with 4 digits is sent to provided email address. User has to enter that code in order to proceed to the profile page and use the facilities.

As another security measure, storing password has been sent through a security process to ensure the user's details are safe. Password is stored in the system in an encrypted way. Password has been sent through an encryption process so that it is hard to retrieve by a third party. When the user enters the password, the password has been subjected to md5 process and it has been concatenated a random value which is known as salt value, and then store in the database.

To notify the failures in the system, notification has been managed to pop up whenever user is trying to do an illegal activity in the system. As an example if the user is trying to enter wrong logging details, it will generate a notification about the failure. Likewise for all the illegal actions, the system has been managed to show pop ups and has been managed to avoid causing system failures whenever user is do an illegal action on system.

## VI. CONCLUSION AND FUTURE WORK

This report describes the design and implementation details of a lottery purchasing and results checking system. The system facilitated with online lottery purchasing with number selection flexibility and automatic results checking functionalities. This system OLPARC avoids the risk of buyer being cheated or mistaken while checking the lottery results.

This system is consists of dynamically changing user interfaces that helps to avoid mistakes made by the user when entering lottery details. Here, the corresponding number of text fields is loaded to the web page or mobile application interface according to each lottery

The automatic notification system of OLPARC application avoid the missing chances of lottery result checking, because it lets user know that how much he/she has won and all the details. Since the user enters all the lottery details as soon as he/she buys the lottery, user does not has to worry about the results checking anymore, since the OLPARC system notifies the user about the winning status after the results has been published.

As for the further development of this application an image recognition method can be implemented, so that user can take a picture of the lottery and the system will automatically detect the lottery and recognize the details of the lottery. Claiming winning prices through this application would be another feature to be included in the future versions. They would be beneficial and much easier for the user.

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