

E-Scratch Cards App & Dashboard (Q-Lotto)

A Web & Mobile Platform to demonstrate operationalisation of
electronic lottery management.

Research Manual

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Table of Contents

1.0 Abstract	3
2.0 Introduction	4
3.0 Background	5
4.0 Existing Lottery/e-Scratch cards Platforms	7
5.0 Features, Functional and Non-Functional Requirements of the system	8
Functional requirements	8
Non-functional requirements.....	8
6.0 Technologies Used.....	10
Languages.....	10
Web Application	10
Mobile App.....	11
Frameworks	12
Web Application.....	12
Mobile App.....	13
Development Tools	13
7.0 Reference	15

1.0 Abstract

The pervasiveness of modern-day computing has to a very large extent affected the way users interact with technology in the request and delivery of day to day business services. Lottery systems which had before now mostly relied on physical interactions between users and organisers for its operationalisation can benefit from this technological paradigm shift.

This project is aimed at exploring the utilisation of web and mobile technologies in the running of an e-scratch card system for electronic lottery platforms, accessible to users conveniently from their wide range of computing devices including mobile phones, handhelds, laptops etc. and in the comfort of their homes, offices or while commuting. With the developed system in place, users will be able to register, purchase scratch card tickets and claim winnings in a convenient manner while putting in place industry standards on security.

2.0 Introduction

This document will outline the research that will be undertaken for this project. Firstly, a review of some existing lottery/e-scratch card systems and how they work will be presented, with a view to comparatively highlighting their features.

Thereafter a discussion on the features as well as the functional and non-functional requirements for the system will follow.

Lastly the document will discuss technologies, tools and software development strategies that will be utilised in the development, testing and deployment of the proposed application suite.

3.0 Background

The proliferation of internet and web technologies has eased and widened access to goods and services for both businesses and their consumers. Users can now from the convenience of their homes, offices or even while commuting, request for goods and services, make payments, schedule deliveries/pickups etc.

A 2016 survey conducted by MetaFacts, an online market research firm focusing on technology markets and telecommunications industries, showed that while 87% of U.S. adults owns and uses a smartphone or basic cell phone, 81% use a home PC. Arne Hoist of Statista affirms this trend of worldwide penetration of computing devices by noting that almost half of households worldwide have computers at home, with developing countries accounting for over 80% ownership of home computers.

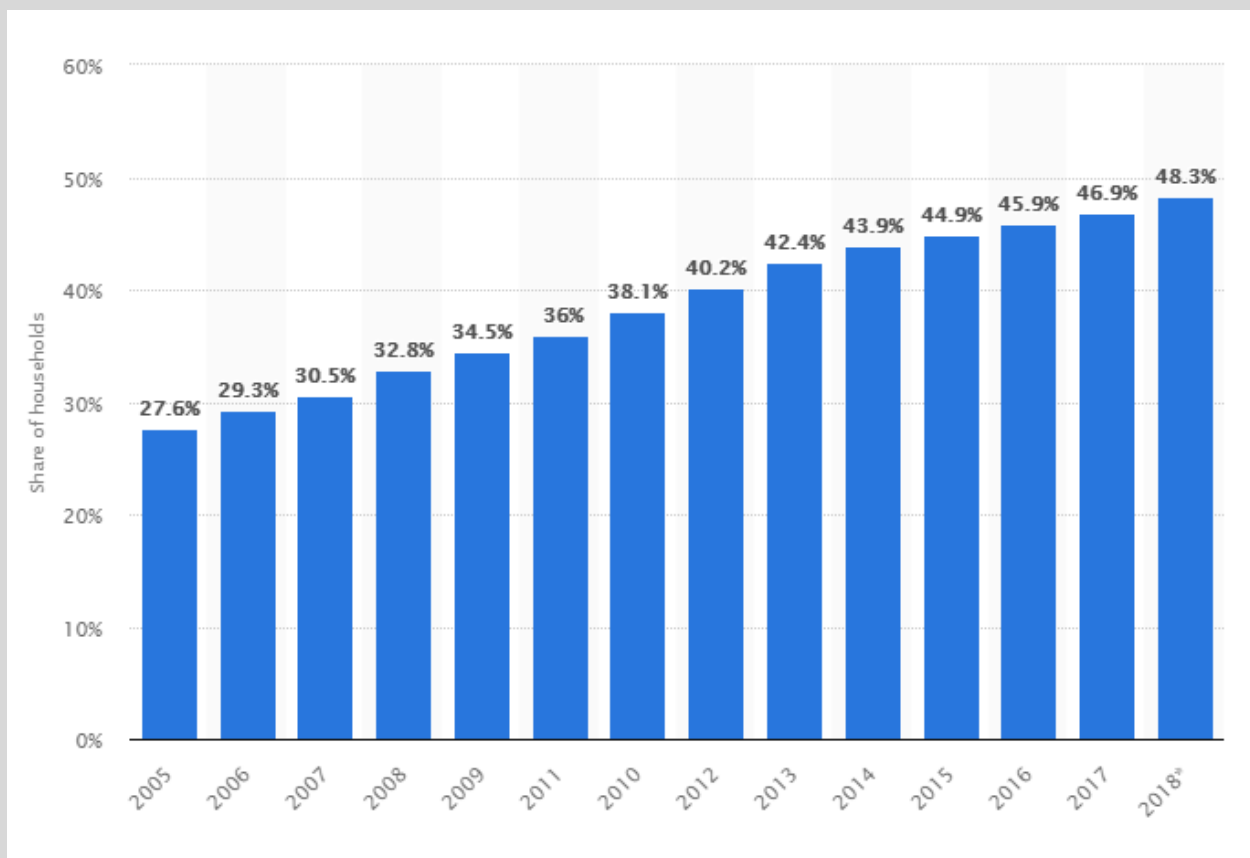


Figure 1 - Share of households with a computer at home worldwide from 2005 to 2018 (source – statista.com)

In likewise manner, internet penetration usage has increased tremendously worldwide within the last decade. Statistics by internetworldstats.com puts world internet penetration/usage at over 58.8% globally. This implies that more than one in two persons worldwide have access to communicate over the internet, consume resources or buy/sell goods and/or services.

WORLD INTERNET USAGE AND POPULATION STATISTICS 2019 Mid-Year Estimates						
World Regions	Population (2019 Est.)	Population % of World	Internet Users 30 June 2019	Penetration Rate (% Pop.)	Growth 2000-2019	Internet World %
Africa	1,320,038,716	17.1 %	522,809,480	39.6 %	11,481 %	11.5 %
Asia	4,241,972,790	55.0 %	2,300,469,859	54.2 %	1,913 %	50.7 %
Europe	829,173,007	10.7 %	727,559,682	87.7 %	592 %	16.0 %
Latin America / Caribbean	658,345,826	8.5 %	453,702,292	68.9 %	2,411 %	10.0 %
Middle East	258,356,867	3.3 %	175,502,589	67.9 %	5,243 %	3.9 %
North America	366,496,802	4.7 %	327,568,628	89.4 %	203 %	7.2 %
Oceania / Australia	41,839,201	0.5 %	28,636,278	68.4 %	276 %	0.6 %
WORLD TOTAL	7,716,223,209	100.0 %	4,536,248,808	58.8 %	1,157 %	100.0 %

NOTES: (1) Internet Usage and World Population Statistics estimates for June 30, 2019, as of Sept 20, 2019. (2) CLICK on each world region name for detailed regional usage information. (3) Demographic (Population) numbers are based on data from the [United Nations Population Division](#). (4) Internet usage information comes from data published by [Nielsen Online](#), by the [International Telecommunications Union](#), by [GfK](#), by local ICT Regulators and other reliable sources. (5) For definitions, navigation help and disclaimers, please refer to the [Website Surfing Guide](#). (6) The information from this website may be cited, giving the due credit and placing a link back to www.internetworldstats.com. Copyright © 2019, Miniwatts Marketing Group. All rights reserved worldwide.

Figure 2 – World Internet Usage and Population Statistics (source – www.internetworldstats.com)

The national lottery system is a business that can benefit from the utilisation of web and mobile technologies as it will facilitate reach and allow for more penetration amongst existing and potential customers who are mostly young adults. European State Lotteries and Toto Association in their publication of 2019 notes that lotto penetration could reach and surpass additional 50% of current participation if better wagering systems and online marketing strategies is utilised and sustained.

4.0 Existing Lottery/ e-Scratch cards Platforms

There are a huge number of existing e-scratch card lotteries and platforms available in the Irish market and worldwide, whose modus operandi is pretty much similar.

Here below is the list of existing scratch card lotteries and online platforms , though the list is inexhaustive:

Diamond Bingo Doubler (www.lottery.ie/scratch-cards)

Bingo Multiplier (www.lottery.ie/scratch-cards)

Congratulations (www.lottery.ie/scratch-cards)

Cashword Doubler and Plus (www.lottery.ie/scratch-cards)

Winning Streak (www.lottery.ie/scratch-cards)

Lotto Direct (www.theLotto.com)

LottoSend (www.LottoSend.com)

Play UK Internet (www.PlayHugeLottos.com)

Legacy Eight

Lotto Agent

(OneLotto.com), Bmillions, Betpoint Group, Camelot Group, IGT, Jackpot.com, LotteryMaster, LottosOnline, Lottoland, Lotto247, Morpheus Games, MultiLotto, Playtech, Svenska Spel, Tatts Group, win2day, Y&M Hans Management Limited, 1xBet, and 24Lottos.

5.0 Features, Functional and Non-Functional Requirements of the system

The proposed application will be a developed, deployed and managed centrally as a single application with single database but with multiple APIs to support interconnectivity and use across native mobile and web interfaces.

Functional requirements

1. Customer Registration/ Signup & Login – Modules/ APIs will be implemented to allow for customer registration using the web or native mobile app. Irrespective of mobile/web interface used, users will be able to use the same usernames and passwords to access the application. Customers will be expected to undergo email and SMS verification before their account creation will be finalized.
2. Ticket generation – The proposed Ticket generation will mimic what is obtainable in the UK National Lottery system. Using this approach, a ticket generation module will be implemented that allows users to pick their six set of numbers (from 1-59) or generate random set of numbers for the entry (lucky dip). Each generated ticket will have a unique and distinct serial number to forestall forging and will be tied to the user for whom it was generated for.
3. Payments for tickets -- A payment module that consumes popular payment processors like 2checkout and PayPal for the purchase of cards will be implemented. Only on payment for tickets will be the ticket become valid for use for lotto.
4. Generation of Winning Numbers – A secure randomization algorithm will be put in place which will be used to generate winning numbers for the lotto session. On generation of winning numbers, only entries of tickets purchased for that lotto session will be considered. Winning tickets will be verified by the system to ensure they were genuinely created and paid for before settlements will be performed.
5. Settlement of Winnings – Settlements for winning will be done only after the system has verified the authenticity and payment for the winning ticket entries. Payments will be made using payment processors (2checkout and PayPal) to customer's specified and verified bank/ account details.

Non-functional requirements

1. Being an online system that is prone to snooping attacks, a Secure Sockets Layer certificate that encrypts communication between users and the system will be implemented.

2. Secure Authentication will be implemented across the platforms (web & mobile). User passwords will be encrypted/salted and stored in a secure relational database system to prevent theft & misuse.
3. User access controls (UAC) will also be implemented to address issues of permissions (who is authorized to do what in the system)
4. The process of registration for first time user should take no more than 10 seconds 90% of the time.
5. It should take the application no more than 8 seconds to respond to user request 80% of the time.

6.0 Technologies Used

Languages

The proposed application will be developed as a web application with Application programming Interfaces for consumption on mobile application developed for this purpose. Consequently, the following of software artifacts, programming libraries & tools will be utilized in achieving this project.

Web Application

PHP

PHP Hypertext Preprocessor (PHP) is a programming language used by web developers to create & add dynamic content to the web. With extensive libraries and support for web technologies, PHP is commonly used in combination with other web technologies & standards including HTML, CSS, JavaScript to create dynamic web pages, websites or related web applications, including those that interacts and depends on some form of databases.

HTML

HyperText Markup Language (HTML) is generally considered the standard markup language for creating & building Web pages. HTML as a markup language allows for the structuring, presentation and organization of contents (text, multimedia etc.) on the web. To allow for the markup of data & related contents, HTML makes use of predefined Elements, also called Tags with which contents are structured in web pages. HTML tags label pieces of content such as "heading", "paragraph", "table", To access and view contents created by HTML, use must be made of browser software. Common browsers in use today include - Google chrome, Mozilla Firefox, Opera browsers etc. Browsers interprets the structure and use of the HTML elements/ tags to properly display and render the HTML web pages/ content. HTML in its implementation and use is platform independent and not agnostic of being integrated with programming languages including PHP, Java, Python etc., to achieve dynamism of contents generation and display.

While HTML is the standard markup language for creating web pages, it is usually used in combination with other web standards including Cascading Style Sheets (CSS) and JavaScript.

CSS

Cascading Style Sheets abbreviated CSS, is a styling standard suited for the web and used for describing the presentation of a document written in a markup language like HTML. As is the case with other languages and web standards, CSS is usually used in combination with other. web technologies like HTML & JavaScript.

In its basic form, CSS is designed to promote the practice of separation of presentation and content & structure. With this idea, web content creators utilize markup languages to create structure for contents to be displayed on the web, CSS is then used to add formatting (color, fonts, italics etc.) to these content for presentation.

This separation of formatting and structure from content helps improve accessibility of content, provide increased flexibility and control in the availability and presentation of the underlying contents. It also facilitates stylesheet reuse.

CSS makes use of stylesheet rules to apply styling to targeted HTML Elements.

JavaScript

JavaScript is a lightweight, interpreted programming language commonly used on the web in combination with popular standards like HTML & CSS. Widely thought of as a programming language which runs inside a web browser, JavaScript allows for the attainment of dynamism of web pages, information exchange between server & client as well as promote rich user experience.

SQL

Our qLotto platform will be heavily dependent on a relational database management system for the storing, retrieval and management of business and operational data. Relational database management systems (RDBMS) are database management implementation platforms that allows for the structuring of data elements with their underlying relationships with other data elements.

Integrity maintenance, access control, structured approach to data processing & handling are some of the benefits derived from using RDBMS.

Structured Query Language (SQL) is the standard, used in the administration and maintenance of relational database systems. SQL provides support for the creation of database structures (Tables and constraint), accessing and managing data (Create, Retrieve, Update & Delete collectively called CRUD operation) as well as controlling who accesses these data and operations, they are authorized to perform on them.

Mobile App

Android Studio

Android Studio is the official integrated development environment for Google's Android mobile operating system. Built on JetBrains' IntelliJ IDEA software and designed specifically for Android development, Android studio is available for download and use on Windows, macOS and Linux based operating systems. With provision and support for all libraries and support for developing mobile applications targeted at the android

operating system, use will be made of the Android studio as the build environment for our intended application.

Frameworks

To begin this section of the document it is important to explain what a framework is in terms of computer systems. A framework is a platform for developing applications which may include libraries to help the developer use existing functions rather than reinventing the wheel. Use of Frameworks allows system implementer and developers to get a project up and running quickly using widely approved and re-used platforms.

Web Application

Bootstrap

Bootstrap is a front-end framework which uses HTML, CSS and JavaScript. Bootstrap provides components that the developer can use to build a responsive web app. It is also possible for the developer to customize the components to suit their needs.

Bootstrap also provide a number of templates which can make getting started with developing a web app a lot quicker. To function, Bootstrap requires a JavaScript Library called jQuery. This library helps with cross browser compatibility.

jQuery

jQuery is an extremely powerful JavaScript library/ framework that provides functionality & tools necessary to create beautiful and rich user experiences on web pages. With jQuery, operations like HTML document traversal and manipulation, event handling, animation, and Ajax much simpler with an easy-to-use API that works across a multitude of browsers can be easily achieved.

Laravel

Laravel is a free & open-source PHP web application framework, created by Taylor Otwell and intended for the development of web applications following the model-view-controller architectural pattern.

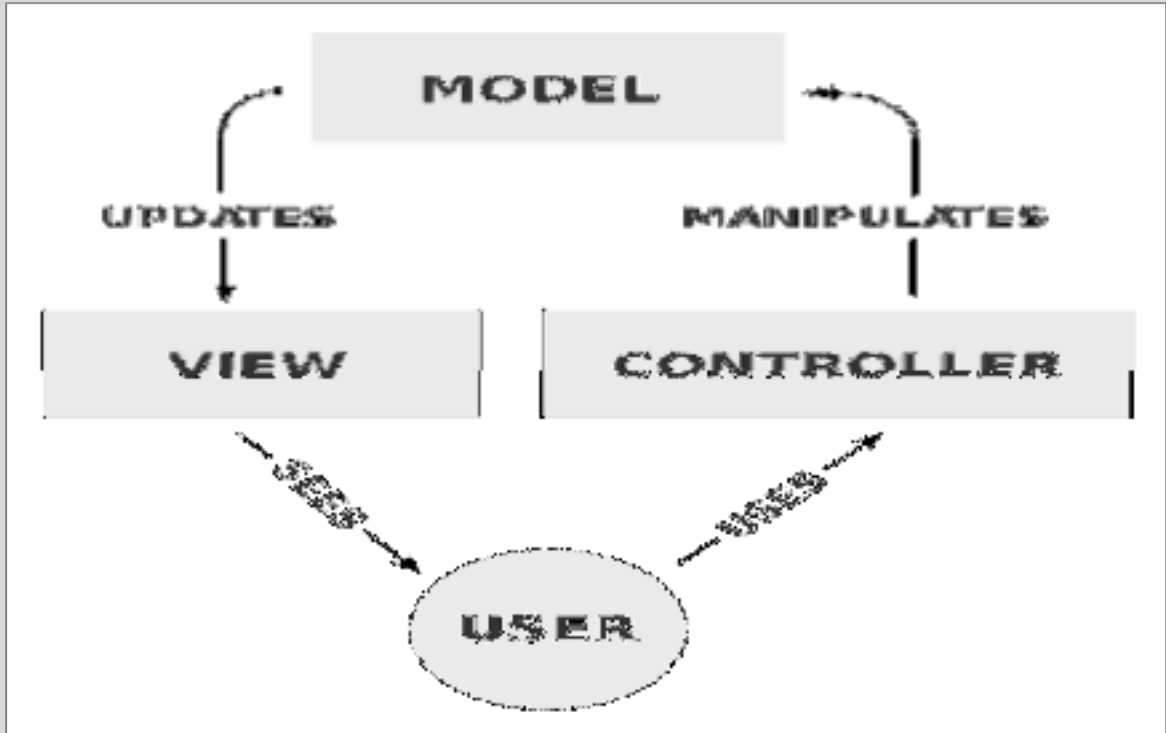


Figure 3 – Model View Controller (MVC) architecture

Laravel which is based the earlier established Symfony framework, has a rich set of libraries, tools and functionality range for constructing everything from small to enterprise-level applications.

Mobile App

ReactNative

React Native is an open-source mobile application framework created by Facebook that can be used to develop applications for diverse mobile ecosystems including Android, iOS, Windows Mobile. In adopting React native as their mobile development framework, React Native enable developers use React along with native mobile platform capabilities to build highly reusable and fully functional mobile applications.

Development Tools

PHPStorm

PhpStorm is a commercial, cross-platform IDE (integrated development environment) for PHP built by JetBrains. Written in Java, PHP provides support for a rich collection of libraries and plugins and users can extend the IDE by installing plugins created for PhpStorm or write their own plugins.

Compared to other IDEs like Visual studio code, Atom etc., Phpstorm is not free but there are free licenses for student use which I obtained and will use for the project.

Webstorm

Webstorm is a light-weight and powerful JavaScript IDE developed by JetBrains. Widely considered to be the smartest editor for JavaScript, Webstorm can be used for both client-side and server-side development.

Unlike other development environments (IDEs) like Atom and Visual Studio Code, WebStorm is not free. As was the case with PHPStorm, I was however able to obtain a free student license. Webstorm features a number of plugins available to install and debugging capabilities for both client and server-side applications.

MySQL Workbench

MySQL Workbench is a database design and administration tool that integrates and provides support for SQL development, administration, database design, creation and maintenance into a single integrated development environment for the MySQL database system.

Developed and maintained by Oracle Corporation, MySQL Workbench has become popular within the MySQL community as it provides a visual database administration environment to perform database administration tasks.

7.0 References

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DECLARATION

- I declare that all material in this submission e.g. thesis/essay/project/assignment is entirely my/our own work except where duly acknowledged.
- I have cited the sources of all quotations, paraphrases, summaries of information, tables, diagrams or other material; including software and other electronic media in which intellectual property rights may reside.
- I have provided a complete bibliography of all works and sources used in the preparation of this submission.
- I understand that failure to comply with the Institute's regulations governing plagiarism constitutes a serious offense.

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