

**Institute of Technology Carlow Software Development**

**Research Document**

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# Abstract

The purpose of this research documents is to investigate and outline technologies which may be suitable for the development of the Odd Job/ Local Exchange Trading Systems application. The main topics investigated include similar applications, appropriate frontend and backend technologies.

# Introduction

The purpose of this project is to develop a cross platform application based on the already existing Local Exchange Trading Systems (LETS). The application can be used by members of a community to benefit the local economy by creating a token based reward system in exchange for work completed. The application will allow users to register a profile and login, search for jobs in their area and offer their services to other users of the application. Jobs completed by a user can be rated by the poster of said job, each job will carry a set value of tokens which will be transferred upon completion of the work.

This report will detail the research that has been carried out to facilitate the development of the application. It will focus primarily on the potential technologies that can be used to develop the application including front-end, back-end and hosting technologies. Similar solutions to this application will also be investigated during the report.

# L.E.T.S as a system

What is a L.E.T.S system?

Local Exchange Trading Systems (LETS) is a locally organized economic system which allows members to participate in the exchange of goods and services among others in the local community group. Local Exchange Trading Systems (LETS) use their own locally created currency which are usually of units of value which can be traded or exchange for goods or services. Members of LETS typically view the systems as organized and cooperative schemes that maximize purchasing power while benefiting members and the community.  
(corklets, 2016)

# Existing Systems

## Application 1.

|  |  |
| --- | --- |
| Name: | Odd Jobs |
| Type: | Application |
| Device: | Android Smart Phone |
| Available From: | Play store |
| Downloads: | 10,000 + |
| Rating | 2.5 |
| Created by: | Sage Nyong |

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |

## Application 2.

|  |  |
| --- | --- |
| Name: | Near Jobs |
| Type: | Application |
| Device: | Android Smart Phone |
| Available From: | Play store |
| Downloads: | 10,000 + |
| Rating | 2.8 |
| Created by: | Near Jobs Inc |

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |

## Application 3.

|  |  |
| --- | --- |
| Name: | Fiverr – Freelance Services |
| Type: | Application |
| Device: | Android Smart Phone |
| Available From: | Play store |
| Downloads: | 1,000,000 + |
| Rating | 4.6 |
| Created by: | Fiverr |

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |

## Likes and Dislikes of the Researched Applications

|  |  |
| --- | --- |
| **Name:** | **Odd Jobs** |
| **Likes** | **Dislikes** |
| Colour scheme | Forced to use GPS location |
| Side form | Slow to load |
| Free to download | Maps not loading correctly |
|  | Zoom out feature not working |
|  | No localised currency |

|  |  |
| --- | --- |
| **Name:** | **Near Jobs** |
| **Likes** | **Dislikes** |
| Colour scheme | Slow to load |
| User Interface | Crashes regularly |
| Good log in features | No localised currency |
| Sort by job |  |
| Sort by category |  |
| Free to download |  |

|  |  |
| --- | --- |
| **Name:** | **Fiverr – Freelance Services** |
| **Likes** | **Dislikes** |
| Colour scheme | Cost to post a job |
| Excellent User Interface | No localised currency |
| Login with Facebook(optional) |  |
| Advanced sort and search and filtering |  |
| Responsive |  |
| Free to download |  |

During my research I selected three applications for review, there are some applications available to the Irish market, but none seem to offer a localised currency aspect which is a key element in my specification. The applications listed in this document share some of the required functionalities, but none seem to have all the features required. (fix)

# Backend

The application will need to store user’s registration, profile information and any data generated from creation of jobs. The application will require a database, because the application will primarily be used with phones a lightweight database if preferred. The database must be scalable, reliable and fast. The two main types of database used in the development of applications are relational and non-relational databases.

## SQL vs NO-SQL

Structured Query Language (SQL) has been primary way data is stored for(xxxxa long time), their popularity with users increased in the 1990s with the release of MySQL.(basdhgfhgdsgf) Not Only Structured Query Language (No-SQL) has been in existence since the 1960’s but has only recently gained traction due to popular databases such as MongoDB, CouchDB and more recently Firebase. (knuthaugen, 2010)

Both SQL and NoSQL do the same thing as in storing data, but both have very different approaches on how they achieve this. With a SQL database the relational approach is used. Tables to store information, the records are represented as columns and rows. A tables relation will include either one-to-one, one-to-many or many-to-many in a SQL database.

(site)

There four types of No-SQL databases are;

1. **Key-Value** - It has a Big Hash Table of keys & values. They are designed for storing the data in key-value pairs and does not have a schema. (site)
2. **Document-based** **-** Stores documents made up of tagged elements. (Example- MongoDB, CouchDB) Each document is assigned a unique key which is used to retrieve the document. They can use a JSON style document structure.
3. **Column-based -**Each storage block contains data from only one column. Column store databases store the data in cells grouped in columns of data, which are then grouped into column families which can only contain a certain number of columns.
4. **Graph-based** - A network database that uses edges and nodes to represent and store data.

(3pillarglobal, 2017)

Some of advantages of using SQL as a database include;

* Structured – Uses rows and columns to store the data
* Free – No cost to use
* Good documentation – There is a good standard of documentation available which will make troubleshooting any problems more manageable
* Fast data retrieval – Searching a SQL database is fast

Some of disadvantages of using SQL as a database include;

* Structuring the data - Could be difficult to structure the data coming back from an app
* Real Time results - not necessarily real time (site)

Some of advantages of using NO-SQL as a database include;

* Good Documentation
* High Performance
* Flexible data model – Has a human readable structure like JSON
* **Scalability**

Some of disadvantages of using NO-SQL as a database include;

* More time is needed to structure the data correctly for fast retrieval of data

(mongodb, 2017)

For the purposed of this research documents a very basic break down of four database technologies has been provided, two examples of SQL and NO-SQL are provided below. Of the four databases researched firebase by google offered additional features. It is cloud based, has real time database retrieval, scalable and offers an authentication feature. (Anoshyna, 2016)

### Example 1.

|  |  |
| --- | --- |
| Name: | Maria DB |
| Developed By: | Community Developed fork of MYSQL |
| Cost: | Free |
| Type: | Relational Database |
| Hosting: | Not Provided |

### (mariadb, 2017)

### Example 2.

|  |  |
| --- | --- |
| Name: | MYSQL |
| Developed By: | Oracle Corporation |
| Cost: | Free |
| Type: | Relational Database |
| Hosting | Not Provided |

## (mysql, 2017)

## NO-SQL

### Example 1.

|  |  |
| --- | --- |
| Name: | Firebase |
| Developed By: | Google |
| Cost: | Free (Community Edition) |
| Type: | Documents Based |
| Hosting: | Cloud Based Provided |

(Firebase, 2017)

### Example 2.

|  |  |
| --- | --- |
| Name: | MongoDB |
| Developed By: | MongoDB Inc. |
| Cost: | Free (Community Edition) |
| Type: | Documents Based |
| Hosting: | Not Provided |

(MongoDB, 2017)

# Frontend

The applications front end will need to be responsive, it will also need to be available across multiple platforms. There are many different technologies available for development I will have to investigate and choose which technologies are the most suitable for this project.

The platforms I would like my project to be available on are;

1. P.C.
2. Tablet
3. Mobile (Android + Apple)

## Development

### Ionic

Ionic is an open-source SDK (Software Development Kit), used for developing hybrid mobile applications. It was released in 2013 and built on top of AngularJS and Apache Cordova.

It has a similar syntax to the Angular framework and is also developed by Google. (ionicframework, 2017)

Like PhoneGap, Ionic uses technologies such as Html, CSS and Java/TypeScript to create hybrid frontend of applications for mobile. Applications can be tested in the emulator, in a browser using a virtual server or on a mobile device. (ionicframework, 2017)

### Html5

Html5 is a mark-up language used for structuring and presenting content on the web. It is the fifth and current major version of the HTML standard. This framework is used to display content on the web. (w3.org, 2017)

### CSS & Bootstrap 3

CSS is the language for describing the presentation of Web pages, including colours, layout, and fonts. It allows for the presentation to different types of devices, such as large or small screens. CSS is independent of HTML and can be used with any XML-based mark-up language.

Bootstrap is an open-source framework for designing websites and web applications. It contains design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions. (Otto, 2017)

### Type Script

TypeScript is a free and open-source programming language developed and maintained by Microsoft. It is a strict syntactical superset of JavaScript, and adds optional static typing to the language. Anders Hejlsberg, lead architect of C# and creator of Delphi and Turbo Pascal, has worked on the development of TypeScript. (site this) Typescript is useful when you have a large code base and also make it trouble shooting much easier. One of the main issues when it comes to typescript is the fact that it is not supported by browsers and must be compiled/transpiled to JavaScript before it can be executed in the browser. (site)use my book

### JavaScript

JavaScript is most commonly used as a client-side scripting language, the code is written into Html pages to make them dynamic. When a user requests an Html page with JavaScript in it, the script is sent to the browser and it's up to the browser to do something with it. JavaScript runs within a user’s browser so long as the browser supports it and it is enabled. A simple example of JavaScript would be the alert box which can be displayed when a user clicks a button and a redirect is implemented, the user is notified via alert box. (w3schools, 2017)

### PhoneGap

PhoneGap is a distribution of Apache Cordova, it creates hybrid apps for mobile using technologies such as HTML, CSS and JavaScript. This enables the developer to develop the application once and build and deploy it to multiple platforms. (PhoneGap, 2016)  
Adobe PhoneGap also provides a Developer test emulator for applications. Once connected a mobile device can be tested without the need to reinstall their application.

### Python

Python is an interactive object-oriented programming language. Used a lot with data science. Relatively easy to work with and has many useful imports available. Web apps can be created with the flask module. Python can be used to build server-side scripts for web applications in conjunction with HTML5, CSS and JavaScript used to build the front end and run client-side scripts.

Python can use several different frameworks for web application development such as Django and Flask. (Bolton, 2016) When creating web applications, there are several Python frameworks to choose from but as the scale of this project is quite small the Flask framework was researched.   
Flask was developed around 2010 and, as stated, is aimed towards smaller web application projects. (Ronacher, 2017)

### Android Studio​

Android Studio is an IDE developed by Microsoft for Android mobile development. Applications can be developed in Android Studio and tested or displayed in the built-in emulator. Applications created in android studio are native, which means they can only be ran on Android devices. If you wished to have the device run on other devise such as windows or different platforms like IOS the code would have to be rewritten which makes the multi-platform development more expensive in both time and monetary terms. (site)

# Tools

## Software Development Process

Process management dfaq is this

UP

## Integrated Development Environments

Visual code  
Atom

## Document Management Systems

Git hub  
Google Docs

## Version Control

Git hub

Testing

jasmine testing framework for

Built for ionic

<http://ionicframework.com/docs/v1/guide/testing.html>

testing

# Conclusion

In conclusion to this research document I have found that although there are similar applications are available to the Irish market, very few match the specification and although one of the applications researched seemed to work well, none were specific to Ireland and there were some issues with the Gps and mapping. An online LETS system web based system exists, but is for a specific region of Ireland and does offer the option to search by region. This shows a need for this application, but I feel there is also a need for an interactive website. A responsive website is will increase the potential user base and make it truly cross platform.

The development of the application will be the hybrid process using the Ionic framework, developed with the use of HTML, CSS and Java/TypeScript. The reason a hybrid application was chosen for development was its ability to develop and deploy it cross platform without having to rewrite all the code to develop it again natively. To create the hybrid application the Ionic framework was chosen for the following reasons.

* Documented - each of the technology’s used within the framework are well documented along with the actual ionic framework having a extensive documents available to the public
* Supported – One of the largest cross platform development framework with millions of users developing applications
* Structured – the framework has a defined structure with modular components
* Uses familiar technology’s such as (Html5, CSS, Java/Typescript)
* It can be used in conjunction with technologies like Bootstrap3
* Most of the code can be reused for web-applications
* Ionic offers an emulator, a virtual server and can be tested in the browser or on a device
* Can be compiled into and android and IOS SDK making it cross platform
* Developed by Google

The integrated development environment (IDE) chosen to work with is visual studio code. It was chosen for this project it is light weight, offers the option to add extensions to the editor and has a built-in command prompt that can be used to generate ionic components without the need to leave the editor.

The database that was chosen was Firebase. The decision for this came after researching both SQL and NoSQL databases. It was concluded that Firebase is the best choice for the project. Since Firebase offers real-time data retrieval, APIs that can handle logins and the structure of the data being returned may be difficult to relay to a tabular database. This No-SQL solution has extensive documentation and various tutorials available via Pluralsight. This makes Firebase an excellent choice for the project.

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