# Final Year Project Report

**Full Unit – Final Report**

A Server Based Local Exchange Trade System for campus

Youcef Adoum

A report submitted in part fulfilment of the degree of

**BSc (Hons) in Computer Science**

**Supervisor:** Kostas Stathis



Department of Computer Science

Royal Holloway, University of London

September 29, 2017

**Declaration**

This report has been prepared on the basis of my own work. Where other published and unpublished source materials have been used, these have been acknowledged.

Word Count: 2139

Student Name: Youcef Adoum

Date of Submission: 27th September 2017

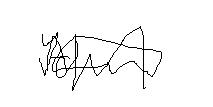
Signature:

Table of Contents

[1.Introduction 4](#__RefHeading___Toc367967467)

[2.Plan Overview 6](#__RefHeading___Toc367967468)

[2.2 Structure 8](#__RefHeading___Toc750_1541255628)

[3. Proof of concept 9](#__RefHeading___Toc752_1541255628)

[4. Reports 10](#__RefHeading___Toc754_1541255628)

[5 Timeline and milestones 11](#__RefHeading___Toc756_1541255628)

[6. Risk Assesment 12](#__RefHeading___Toc758_1541255628)

[7. Bibliography 13](#__RefHeading___Toc760_1541255628)

1.Introduction

A Local Exchange Trade Systems (LETS) [2] are systems that local communities can create to develop exchanges that happen outside of the monetary circuit. Members of the LETS identify skills they wish to offer and their current requirements for goods and services, which are listed via a LETS web site.

LETS encourage people to be socially active when making a trade, making both parties receive a service without economic interest. They are considered to be from the community for the community[3].

This thesis will explore the methodologies, tools and software development techniques to fully implement a local exchange trade system using the current web technologies using the Royal Holloway community as a scope for such a system.

1.1 Abstract

Society today and for hundreds of years has been interested in trade for socioeconomic interest and thanks to the rapid advancement in technology, We can now carry out a number of different monetary transactions without ever leaving out house, in fact thanks to the technological advancements such as the world wide web founded by Tim Berners Lee [4],we can make money without leaving our houses, we can survive without leaving our houses and its having huge ethical implications on todays society.

1.2 Motivation

My motivation for carrying out this project is to counteract some of the hindering social and ethical factors the current trading systems have imposed on society by providing a system which can supplement the current monetary system by using technological advancements to there full potential. The system will introduce the concept of meeting in person to strengthen social links as opposed to economic interest, this will promote integration and collaboration within a society.

Monetary circuits can also be unfavourable for people of a lower socioeconomic background for example certain activities such as polo or language learning, can be very costly for some individuals. This constraint means in such a system a person can be bound by their socioeconomic background. With a LETS system it encourages fairness and diversity by valuing skills and trades anyone can possess, all that is required is a willingness to learn and teach.

1.3 Aims and objectives

By creating a website focusing on user experience with features such as easy accessibility, friendly interface design and fast response times the system will be;

* Portable and accessible from anywhere, users will not have to download anything or have to purchase any additional software or hardware thus making the system accessible to all students with no bias.

By prioritizing security and stability the system will be trustworthy and comply with legislation such as the data protection act.

* Users will feel safe providing there information and can assume the anonymity of virtual trading can exist if they require confidentiality or likewise they can showcase there transactions to encourage others to do so.

By accounting for the scale of the system and complexity

* I will use optimized algorithms to search and retrieve and store information as well as software engineering techniques to maintain performance whilst the user base grows in size.

These objectives described will ensure a robust easy to use system can be built which can be used on a daily bases by the local community to combat the implications discussed above by a monetary based system.

2.Plan Overview

2.1 Components

The local exchange trade system will be categorized into several key components which make up the system.

From the different components i will decide which milestones i should focus on first and which proof of concept programs i need to accomplish to build my system.

**Component Key Attributes Priority Learning Goal References**

Graphical Layout

Draw up layout and research HCI

HTML Components

Basic website using html 5

*Web Design with HTML, CSS, JavaScript and jQuery Set-*

*Jon Duckett*

Interface Design

Multimedia

(Videos, Graphics)

Create custom art for website

Adaptation to

Smartphone devices

Research Responsive web design

*Mastering Responsive Web Design-*

*Ricardo Zea*

CSS Components

Mock website styled with css

PHP and javascript

Use XAMPP on local host , mock login system

*Murach's PHP and MySQL, 2nd Edition-*

*Joel Murach*

Optimal

Database SQL

Create mock database using researched techniques + Testing

Algorithms

Recommendation

Algorithms

Implement algorithm to mock site after researching

*www.youtube.com/user/thenewboston*

Optimal Search

Algorithms

Implement algorithm to mock site after researching

*www.youtube.com/user/TheCharmefis*

Randomization

Algorithms

Implement algorithm to mock site after researching

*Top security threats*

Rules, Common practice

and legislation

E.g Data protection act

Research and implement practices on mock website

Security

Web Security threats

and countermeasures

Including databases

and all tools

and methods used

Research and carry out penetration testing on mock website

*Knuth, Donald (1998). Sorting and Searching. The Art of Computer Programming. 3 (2nd ed.). Reading, MA: Addison-Wesley Professional Knuth 1998, §6.3 (Digital Searching).*

Privacy

Research and carry out penetration testing on mock website

Draw Multiple UML diagrams such as sequence, class and use case

UML diagrams

Software

engineering

Design Patterns

Research common design patterns such as MVC and implement in mock site

*Head First Design Patterns: A Brain-Friendly Guide 1st Edition-*

*Eric Freeman*

Database Schema

And Design

Draw ER diagrams and build up the schema using DBMS

Computational complexity of

Growing web systems and

adaptation of algorithms

to sustain performance

Research web systems and scalability , carry out tests on mock site

Scalability

Storage and

bandwidth management

Research web systems and scalability , carry out tests on mock site

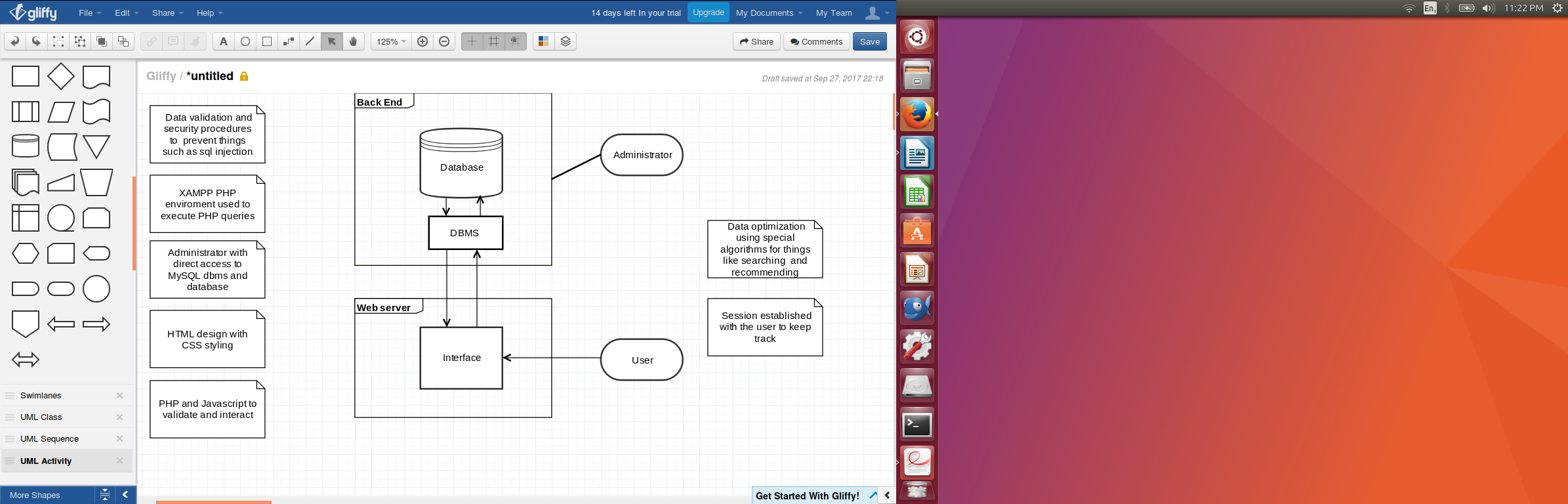
Testing

Testing procedures e.g. tdd

, stress ,integration ,functional

Research common procedures testing is ongoing throughout development as TDD is used

2.2 Structure

The fundamental structure of the system will consist of many webpages accessed via a php login system hosted on a webserver.

Any queries will be handled via the DBMS running mysql.

An administrator will have full access

All data sent must be verified and validated to prevent security flaws and ensure smooth operation.

All work will be stored using the repository github account name: theolegoose

3. Proof of concept

Early Deliverables

Based on the attributes I have identified above I will need to carry out extensive research and code several proof of concept programs to enable me to build the best possible system.

This will predominantly consist of a mock website made on local host to improve my HTML and CSS skills. XAMPP will be used to interpret the PHP code and allow me to learn how make the login and verification system.

From this core mock website i will be able to add other complex functions such as recommended search features.

HTML and CSS

The interface requires a certain amount of html and css scripting, I have already begun to create a simplified webpage design to get accustomed to creating a more robust design minimizing code smells such as duplicate code.

Php and JavaScript

Php will be used to communicate with the web server and used when validating users when logging in. I have already began to create a basic logging in system which validates a user.

JavaScript will be used to provide interactive elements, I will also add javascript to my mock website as it will be used as a fundamental language.

Search and Recommendation Algorithms

When a user wants to find the local trades available its imperative a good search algorithm is used so it can proficiently find trades the user will want with a high acceptance rate. This will not only improve user experience but also maintain performance as the user base grows.

I will need to investigate the best search algorithms for the scenario and implement a basic search feature in my mock website.

Randomization Algorithm

I have decided to include a feature which allows a user to search the local trades and return one randomly. I will also need to research this concept.

4. Reports

**Report 1**-Tools and techniques

The first report I will be writing about in the first term will be concerned with optimal searching algorithms on large amounts of data .This will include methods that can distinguish items a user will more likely choose and display them nearer the top of the list of matches.

**Report 2**- Online security

As the mock website begins to finish with many special algorithms and concepts introduced i wil also need to carry out extensive research on security and its implications in an online system and some of the countermeasure used to prevent common attacks.

**Report 3** -software engineering techniques

To efficiently build the real system i will need to investigate the current best software engineering techniques and design patterns to use.

**Requirement specification**

As the term comes to an end and all proof of concept programs have been made, i will focus my attention on producing a requirements specification before beginning to building the system for real.

**Second term reports**

I will cover the remaining aspects in my second term reports such as scalability issues and work on the final deliverables.

5 Timeline and milestones

Week 1 16/09/17

1.Set up accounts

2.Begin plan

Week 2 23/09/17

1.Work on plan

2.Start Mock website learning HTML and CSS

1.Submit plan

2. Finish basic HTML and CSS start PHP to learn server programming

Week 4 7/10/17

Week 5 14/10/17

Week 6 21/10/17

Week 7 28/10/17

Week 8 4/11/17

Week 9 11/11/17

Week 10 18/11/17

Week 11 25/11/17

Week 12 2/12/17

Week 3 30/09/17

1.Start Algorithms report

2. Begin adding harder JavaScript

1.Finish Interim report

1.Continue Algorithms report

2. Continue adding complex algorithms to mock website

1.Finish Algorithms report

2.Ensure algorithms made from report pass all tests

1.Finish Algorithms report

2.Ensure algorithms made from report pass all tests

1.Begin security report so I can learn the techniques used before I make the real system

1.Finish security report

2. Penetration testing of the mock system to find flaws

1.Begin Software engineering report

2. Begin UML diagrams for real system

1.Ensure all reports are finished pull together for interim report

2.Finish uml and database scheme for real system

6. Risk Assesment

|  |  |  |
| --- | --- | --- |
| Identified Risk | Explanation | Mitigation Strategy |
| Security  Severe Security bugs discovered | Security flaws are being discovered at an alarming rate and all it takes is something such as the heartbleed bug[5] to cause change, such as vulnerable ssl, and make a the system insecure  Towards the end of the project if a new severe security flaw is discovered, it could cause the way the system works to change dramatically and pose risk to peoples real sensitive information I would store in a database which could even cause legal implications. | Stay up to date with the latest info sec news and prioritise security when making any changes to how the system works.  Carry out regular penetration tests and keep encrypted backups of relevant data. |
| Availability  Web server is taken down or ddos attack | A distributed denial-of-service (DDoS) attack occurs when multiple systems flood the bandwidth or resources of a targeted system, usually one or more web servers.  This will effectively disable the whole system. | Ensure all data is always current and backed up.  Create a backup server which can be deploy if the main one goes down. |
| User experience  Usability and compatibility issues | Many different web browsers exist today and they may display content differently or be incompatible with different scripts  I will be limited in which web browsers i am able to test my system with as i dont have the money to employ large testing teams to test hundreds of browsers. | Use scripts which rely on common libraries or things like flash which most clients will have installed and up to date |

7. Bibliography

1. Dave Cohen and Carlos Matos. *Third Year Projects – Rules and Guidelines*. Royal Holloway, University of London, 2013.
2. <https://projects.cs.rhul.ac.uk/List.php?PROJECT-TYPE=Full> -*Local exchange trade systems*.Royal Holloway University of london 2017.
3. Linton, Michael (August, 1994). [The LETSystem Design Manual. Landsman Community Services Paper No. 1.3 Version No 1.3](http://archive.lets.net/gmlet/design/dm1%5e3.html)
4. [BERNERS-LEE, Sir Timothy (John)](http://www.ukwhoswho.com/view/article/oupww/whoswho/U12699). ukwhoswho.com. [Who's Who](https://en.wikipedia.org/wiki/Who's_Who_(UK)). **2015** (online [Oxford University Press](https://en.wikipedia.org/wiki/Oxford_University_Press) ed.). A & C Black, an imprint of Bloomsbury Publishing plc.
5. [Cyberoam Security Advisory – Heartbleed Vulnerability in OpenSSL"](http://kb.cyberoam.com/default.asp?id=2909&Lang=1). http://kb.cyberoam.com/default.asp?id=2909&Lang=1
6. ["Understanding Denial-of-Service Attacks"](https://www.us-cert.gov/ncas/tips/ST04-015). https://www.us-cert.gov/ncas/tips/ST04-015