SECURE WEB-BASED EXAM PAPER GENERATION SYSTEM

By

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Declaration

I herby certify that this material, which I now submit for assessment on the programme of study leading to the award of **BSc (Hons) in Computing** in the Institute of Technology Blanchardstown, is entirely my own work except where otherwise stated, and has not been submitted for assessment for an academic purpose at this or any other academic institution other than in partial fulfilment of the requirements of that stated above.

Dated: 23 October 2016

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Abstract

The main goal of this project will be to develop a secure web-based exam paper generation system. The system should support multiple users, subjects and courses. The end product should allow for the generation of pools of questions within a topic area and should also be able to generate exam papers based on a random selection of questions within a given pool or subject area.

The system should store historical data about which questions were used in what year and should avoid using the same question year on year. The system should also allow the user to have the ultimate say in what questions are chosen by allowing randomly selected questions to be replaced with other questions from with the same pool.

The system should also provide the ability to link marking schemes with questions and should ensure marking schemes are correct and add up to the correct totals. The system should be entirely secure from the login process to the storage of data and data in transit.

Keywords: Web-frameworks, Security, Encryption, Databases, HTML, CSS, Java

Motivation: With the growth of mature students entering third level educational institutions around Ireland. Mainly due to the economic downturn which has resulted in many working class people finding themselves unemployed.

It is for this reason why programmes were put into place by the Irish Government and European Union to establish a structure by investing in these peoples education and skills and thus offering them support when it comes to seeking employment once again. Either in fields which they are familiar with or something completely different.

It is initiatives like these which is supported and funded by authorities and governing bodies such as SUSI and the ESF Ireland which have lead to bringing the unemployment rate of persons aged 25 - 74 years down in the last two years by 2.7% CSO (2016) ESF (2016).

The difference between the total number of people now employed since September 2014 and September 2016 is 50, 200 persons. That is a great deal of people in terms of a two year period. These people attending the institutions could have not seen a classroom for more than twenty to thirty or up to forty years or more let alone used a computer and thus require a greater deal of help or attention. As some of them might be exploring an IT field.

It is this one on one attention that they desperately need and freeing up a lecturers time for this would be of great benefit. Since being exposed to college life and the reality of being a mature student have witnessed this firsthand. Most lecturers teach numerous subjects. And for each subject they need to put together numerous exam papers to account for semesters and repeats. This could total many hours of composition for their many subjects.

If a system was in place to automatically generate exam papers this will take away from the time that it takes to compose them. They would be able to give this time back to their students. In the form of a meeting for Q & A or for revision work. This is the impact that an exam paper generation system could have on the lives of mature students if successful.

Problem statement: Compiling an exam paper which will test the students knowledge in a particular subject is challenging in its own way. Firstly, there are the time constraints. Examiners a being faced with more and more work each year within the same space of time. If you add up the amount of time per semester over a given year which is set aside to put together an exam paper it will add up to many hours.

There needs to be a better approach to minimise these hours. It will take a great deal of time to produce a good quality paper. The questions need to be taken from the curriculum which was or is being delivered to the students over the semester. This brings upon the need to develop a paper from as many of the important areas of the module as possible. As this will be the process of determining the students

performance with regard to the questions which are asked and the complexity of them. The result of good exam question will determine the sort of student the college will produce.

Approach: The approach towards this project will be to do as much research as possible around the work of others. Reading the research papers which are available on the internet and in journals.

Which technologies and methodologies were used and incorporated into their work. If they had any shortcomings. See which improvements can be made. One can streamline a complicated version if one is available. And combining the methods of others to form one which is more successful. Furthermore, how long ago their work took place as perhaps a technology has caught up to what they were trying to achieve and would now be in a position to overcome any weaknesses.

For the purpose of this project the SDLC of choice will be the Agile Model. Which takes measures such as planning, analysis, designing building and testing. This will be done in small increments. Each time building on what is currently available and adding to it. Until all features are in place for a full system release.

Results: A conclusion has yet to be established. The results should represent a system which is better than the one in place offering a defined gain to the current method for examination compilation. This will be determined once the system is in place and can be tested in a scientific manner by comparing the two methods.

Conclusions: To follow.

Acknowledgements

I would like to thank my wife Jennifer Holmes and Mr. Stephen Sheridan...

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Abbreviations

SUSI	Student Universal Support Ireland
CSO	Central Statistics Office
ESF	European Social Fund
IT	Information Technology
SDLC	Systems Development Life Cycle
REQ	Requirement Analysis
UML	Unified Modeling Language
ERD	Entity Relationship Diagram
CSS	Cascading Style Sheets
HTML	Hypertext Markup Language
IDE	Intergrated Development Environment
JSP	JavaServer Pages
BLOB	Binary Large Object
SQL	Structured Query Language
PHP	Hypertext Preprocessor
JAVA	Just Another Vulnerability Announcement

Chapter 1

Introduction and Background

1.1 Title

SECURE WEB-BASED EXAM PAPER GENERATION SYSTEM

1.2 Background

With every new college year and semester, lecturers are faced with the prospect of composing examination papers for the next coming months. Since this can prove to be a very tedious and physically demanding task. More over, it can also be very challenging due to the time consumption and nature of the process for the examiner. The traditional method of composing papers can be automated. Therefore, there exists an opportunity to provide a service to simplify the process.

The use of a Web-based examination paper generation system which makes use of a relational database and database tables to cross-reference the newly created table of randomised questions with the tables from the previous years or semester. Resulting to a non-repeating question sheet.

1.3 Main Research Question(s)

1. **What will the end user experience be like, or will they prefer the old fashion method to what they are used to?**

   Not everyone can adapt to change as well as others. This is why getting used to a new system could take some time. Some folk may even get frustrated to the point where they find the new interface impossible to use. This is not the intension. The project is meant to make the process more streamlined and user friendly. This is why a great deal will be taken in the design of the user interface to make the experience a pleasurable one.

2. **Could the presence of an automated generation of questions system improve the accuracy of questions over a manual generation?**

   There are many factors which can affect a human beings output when given a task. These factors could range from fatigue. Being distracted by a colleague. Or not having the focus needed to complete the task at hand. This is where machines have the advantage over us. Humans suffer from what is called, ”Human error.” Whereas a machine can produce the same output with precision and repetition. This is why an automated system would work in college environment.

1.4 Justification / Benefits

When it comes to that time of year where lecturers need to set aside the time to create their examination papers for the modules which they deliver. This is where this project will come into its own with the aim of taking the stress out of the procedure and to provide examiners an easy to use means of examination paper compilation. This usability will come from a combination of a clean and simple user interface along with useful tools to create examination papers.

1.5 Feasibility

Since there are numerous examples of this implementation on the internet. This comes from reading research papers from other students in colleges and technical institutions all around the world. Furthermore the prerequisites obtained from this projects supervisor ensures that the project is technically feasible. However, some research needs to be undertaken regarding the security and encryption aspects. This will be the main technical difficulty and therefore there needs to be a sufficient technical understanding of the technologies involved in order to complete the project.

1.6 Proposed Methodologies

To articulate the methods and techniques used in this plan. Below is the outcome after reviewing various SDLC methodologies with reference to tutorialspoint (2016):

- Adoption of the Agile Model.
- Suits the requirements for this project.
- Widely accepted within companies within the IT industry.
- Valuable learning curve in gaining experience with this model.
- Model has the ability to adapt and tailor itself within each increment as the project moves forward.
- Advantageous to the project.

1.7 Expected Results

As noted in the Feasibility section the project should be feasible from a technical standpoint. It is therefore expected that the project will result in a fully-functioning web site that makes

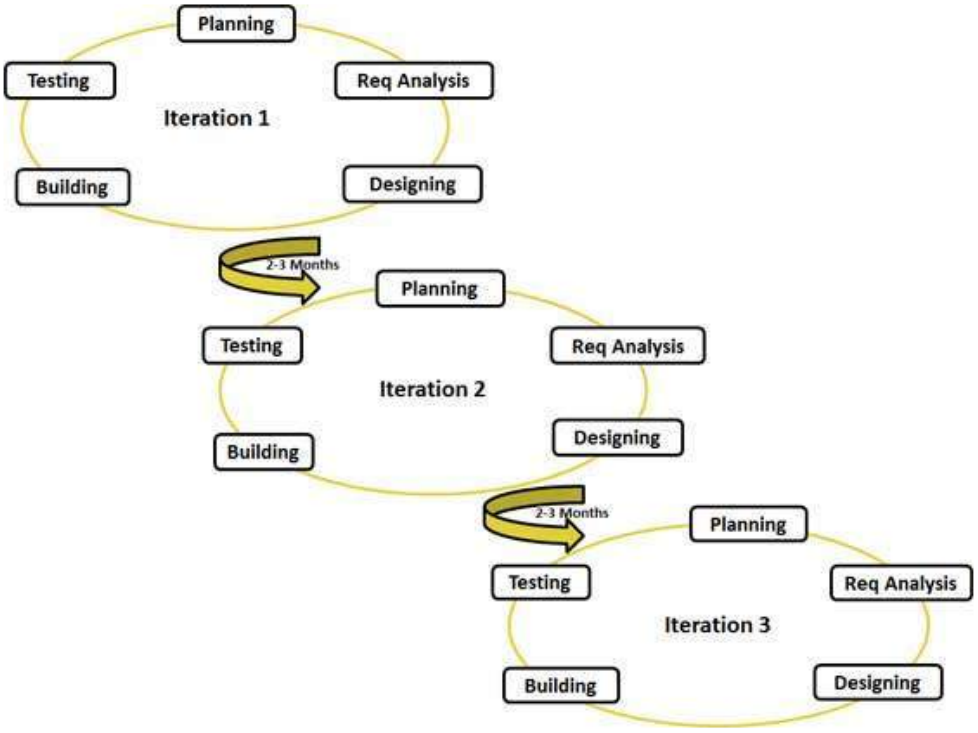

Figure 1.1: Graphical illustration of the Agile Model (tutorialspoint, 2016)

use of the technologies provided.

1.8 Conclusion

This project aims to provide a simple and easy to use service through the use of various Internet technologies combined with automatic generation of question papers and functions. It is hoped that such a service can reduce both the time and difficulties experienced by examiners during an busy time of the year.

1.9 Project plan

Table 1.1 Which shows the Work Breakdown Structure.

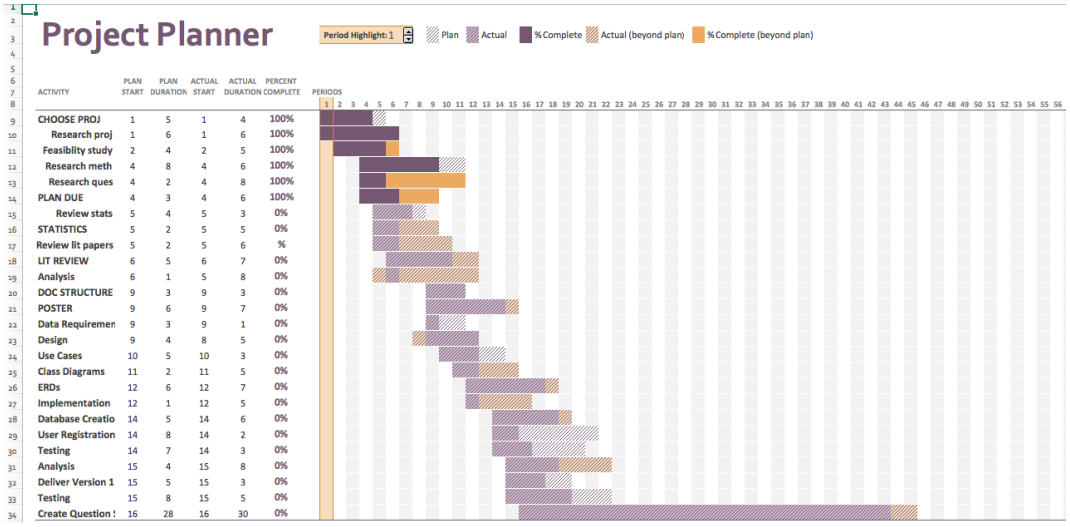

Figure 1.2: Gantt Chart

Task Name	Start	Finish	Duration
Planning	12/09/2016	17/10/2016	42d
Project Plan	12/09/2016	26/09/2016	14d
Research Project Ideas	12/09/2016	26/09/2016	5d
Project Proposal	27/09/2016	12/10/2016	5d
Feasibility Study	12/10/2016	14/10/2016	13d
Research Methodologies	14/09/2016	16/10/2016	7d
Create Project Proposal	16/10/2016	26/10/2016	5d
Submit Project Proposal	26/10/2016	26/10/2016	0d
Literature Review	26/10/2016	31/10/2016	2d
Submit Literature Review	31/10/2016	07/11/2016	0d
Development	07/11/2016	12/12/2016	108d
Version 1	12/12/2016	12/09/2016	28d
Analysis	14/09/2016	30/09/2016	7d
User Registration	14/09/2016	30/09/2016	7d
Question Entry	28/10/2016	12/09/2016	7d
Create Question Section	28/10/2016	12/09/2016	7d
Design	28/10/2016	31/10/2016	7d
Use Cases	28/10/2016	31/10/2016	2d
Class Diagrams	31/10/2016	07/11/2016	2d
ERDs	31/10/2016	07/11/2016	2d
Wireframes	31/10/2016	07/11/2016	1d
Implementation	31/10/2016	12/09/2016	14d
Database Creation	31/10/2016	07/11/2016	2d
Home Page	31/10/2016	07/11/2016	3d
User Registration	31/10/2016	07/11/2016	4d
Question Entry Page	31/10/2016	07/11/2016	4d
Deliver Version 1	07/11/2016	12/12/2016	0d
Testing	07/11/2016	12/12/2016	11d
Review Version 1	07/11/2016	12/12/2016	7d
Analysis	07/11/2016	12/12/2016	7d
View Listings	07/11/2016	12/12/2016	7d
Show Questions	12/12/2016	12/12/2016	7d
Generate Questions	12/12/2016	15/12/2016	7d
Design	12/12/2016	15/12/2016	7d
Use Cases	12/12/2016	15/12/2016	3d
Wireframes	12/12/2016	15/12/2016	2d
ERDs	12/12/2016	15/12/2016	3d
Implementation	09/01/2017	15/12/2016	14d
Database Changes	09/01/2017	15/12/2016	2d
View Questions Page	09/01/2017	09/01/2017	4d
Generate Question Page	09/01/2017	09/01/2017	4d
Testing	09/01/2017	09/01/2017	12
Deliver Version 2	09/01/2017	09/01/2017	7d

Table 1.1: Table to represent the Work Breakdown Structure

Chapter 2

Literature Review

2.1 Abstract

This chapter looks at existing research and development samples undertaken by other students from many countries around the world. These undertakings which have been published were sourced from publishings in academic papers, journal articles and books and gathered together from the major works to form part of the research of this narrow topic as they are in the same field of various implementations of random and automatic examination paper generation.

2.2 Literature Review

(Guang Cen, 2010) presented a method to eliminate (Mumbai, 2016) the tradition of the manual composition of examination papers which would usually rely on the writers own experience and style of question and knowledge. Although great care would be taken to achieve the best possible outcome of questions with traditional methods there was still the problem of a limited scope of topics and a time consideration. This would bring upon the separation between teaching and creating test papers by means of an automated computer system (Yang Yu, 2008). Comprised of JEE the test system includes modules such as user, subject, question, paper and classification management. Included in this is a question entry

and generation module. These modules can be seen in Figure 1 Schematic diagram of the system function module The question entry and generation makes use of browser and server architecture with a connection to a database of questions. Between this layer is a test server and a WWW server making up the middle layer (Chen, 2008). Figure 2 Technology road-map of the system shows a flow chart of the system architecture and the use of the MVC pattern with a JSP view, Java Beans, Servlet Controller and a MySQL database (Liu, 2008). The page layout uses divs and CSS technology. In addition to this is support from JavaScript (R. Johnson, 2004). It is the browser which allows the user to choose the subject which they intend on examining. A question type such as student input and a difficulty level. With all these combined parameters, a paper is generated using the generation algorithm (Wang, 2008). This will then be stored in the test database which can be recalled at any stage through system functions for query, or to update the database and for maintenance. It runs in separated modes for user and administrator use. In the end the final document is processed into a Microsoft Word .doc file for distribution in an exam environment. From Figure 3 Flow chart of the automatic paper generation method it shows how the document is generated.

There are 3 categories which this system falls under. They are, random algorithm based systems, backtracking systems and artificial intelligence and information processing. The first two do not satisfy the specifications (Guiying Deng, 1998). It is the latter which has been improved to avoid the disadvantages of the first and second algorithms. Giving it the ability of searching for questions based on experience and knowledge which guarantees a high standard and quality of examination papers (Hou, 2003). Through using a system with artificial intelligence and information processing the algorithm works quickly and effectively by not selecting a repeated question in a random manner. Questions and answers are separated. It also allowed the user a choice of topics, degree of difficulty, proportion or mark allocation and number of questions per section.

(Yajuan Zhang, 2011) proposed that although the traditional algorithms in a test paper generation system satisfy the requirements of shuffling the questions. Under certain constraints they do not perform as well as others which have been newly adopted. Here follows a

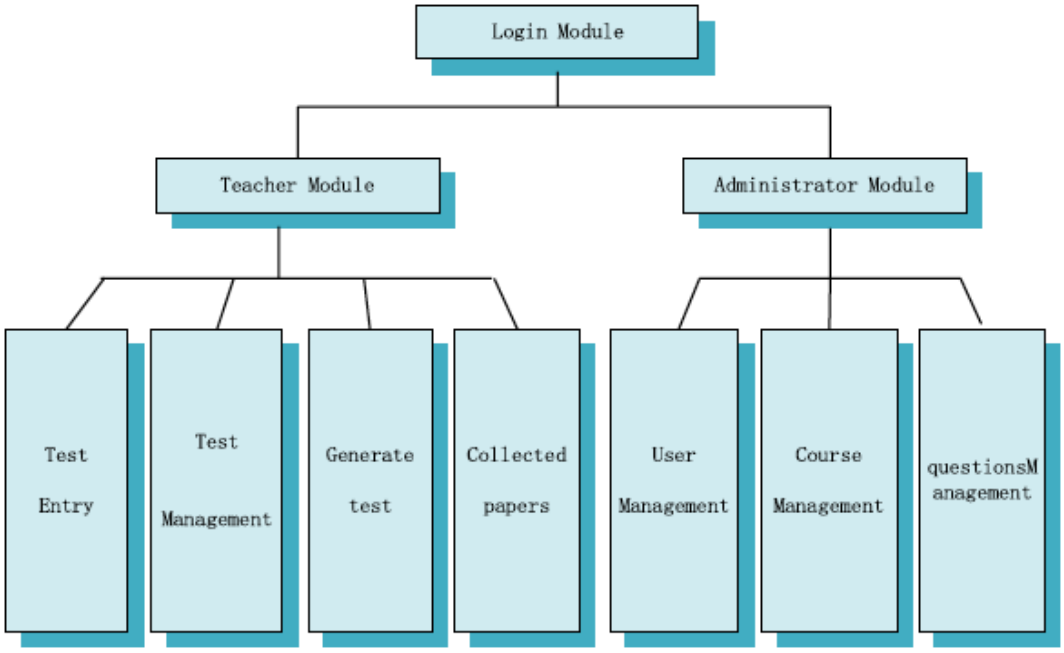

Figure 2.1: Schematic diagram of the system function module (tutorialspoint, 2016)

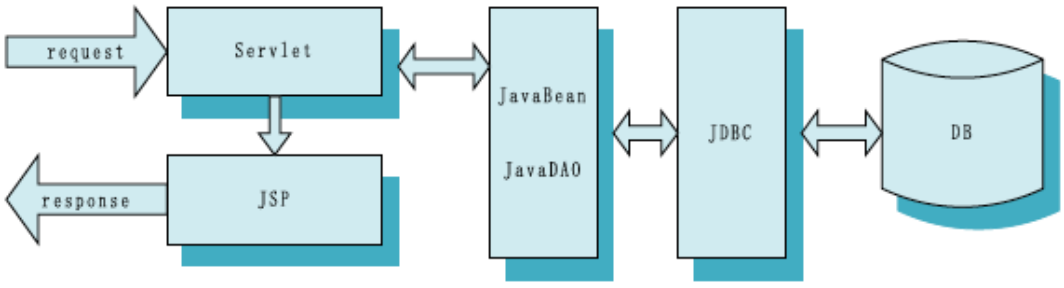

Figure 2.2: Technology road-map of the system (tutorialspoint, 2016)

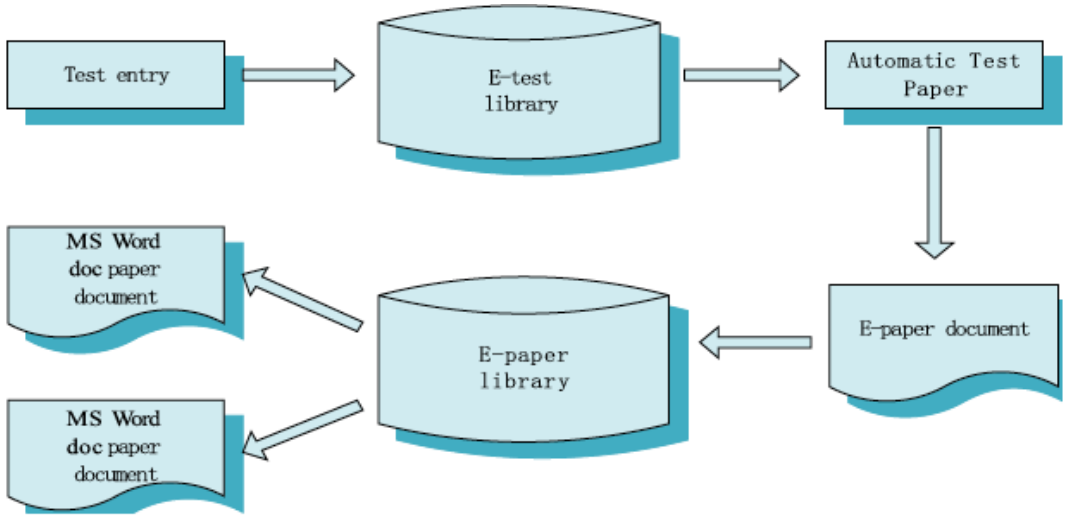

Figure 2.3: Flow chart of the automatic paper generation method (tutorialspoint, 2016)

discussion of analysing five intelligent algorithms and how these existing global optimisation algorithms can be integrated into improved shared global optimisation algorithm and dynamic multi branches tree algorithm. These included, improved genetic algorithm, differential evolution algorithm and ant colony optimisation. The particle swarm optimisation algorithm and simulated annealing algorithm. These are divided into two categories which are population evolutionary and others are individual evolutionary and each uses different searching and selection mechanisms. There have been many different studies on trying to improve the algorithms used in terms of speed optimisation however, the improvements were only minor ones. And with the expansion of the system new classifiers need to be constructed for the added samples. The characteristics of the different global optimisation algorithms such as the improved genetic algorithm. Based on the genetic algorithm with modifications such as improvements to integer coding which displays higher search speeds performing well and is very practical. It also avoids prematurity which occurs in the genetic algorithm. The genetic algorithm performs a randomised search simulating natural selection and genetic variation to problem solve. With the disadvantage of having a low search efficiency with premature convergence. The differential evolution algorithm is simple and effective in that the population size remains unchanged throughout the operation process. These operations

include variation, crossover and selection with advances such as simple principle, control parameters, robustness a high convergence rate and straightforward realisation. The ant colony algorithm simulates an ant colony and their routing behaviours in nature. Finding a solution through information exchange and cooperation among the ant colony. However, the mechanism for feedback has a slow convergence speed. The particle swarm optimisation algorithm has good performance however, needs to be used indirectly in getting the optimal solution of multiple object optimisation problems. As during a search its own position needs to be updated through a follow up of individual extreme value and global extreme value. Simulated annealing algorithm finds the probability sense using a random search. Which is a global optimisation method. (Dan Liu, 2013) derived a method for test paper generation through using the ant colony algorithm. A comparison is also made between using other algorithms such as a random variable algorithm a backtracking algorithm and an artificial intelligence algorithm. Describing the random variable algorithm is that is extracts questions and if they meet certain conditions it then forms a test paper based on these conditions. However, it can fail to meet these requirements. Which in turn offers a poor success rate. The backtracking algorithm works well on small scale generation. Once the scale is largely increased so the time taken to process the generation increases. A new approach would be to compose test papers using the ant colony algorithm as it can search at a far greater speed with and intelligent search.

Chapter 3

Methodology Chapter

3.1 Introduction

Agile is not a methodology but more of an alternative to the existing SDLC Models. To articulate the methods and techniques used in this plan. In figure 3.4 is the outcome after reviewing various SDLC methodologies with reference to tutorialspoint (2016):

- Adoption of the Agile Model.
- Suits the requirements for this project.
- Widely accepted within companies within the IT industry.
- Valuable learning curve in gaining experience with this model.
- Model has the ability to adapt and tailor itself within each increment as the project moves forward.
- Advantageous to the project.

3.1.1 What is Agile?

Agile is an iterative approach to software delivery that builds software incrementally from the start of the project, instead of trying to deliver it all at once near the end. It works by

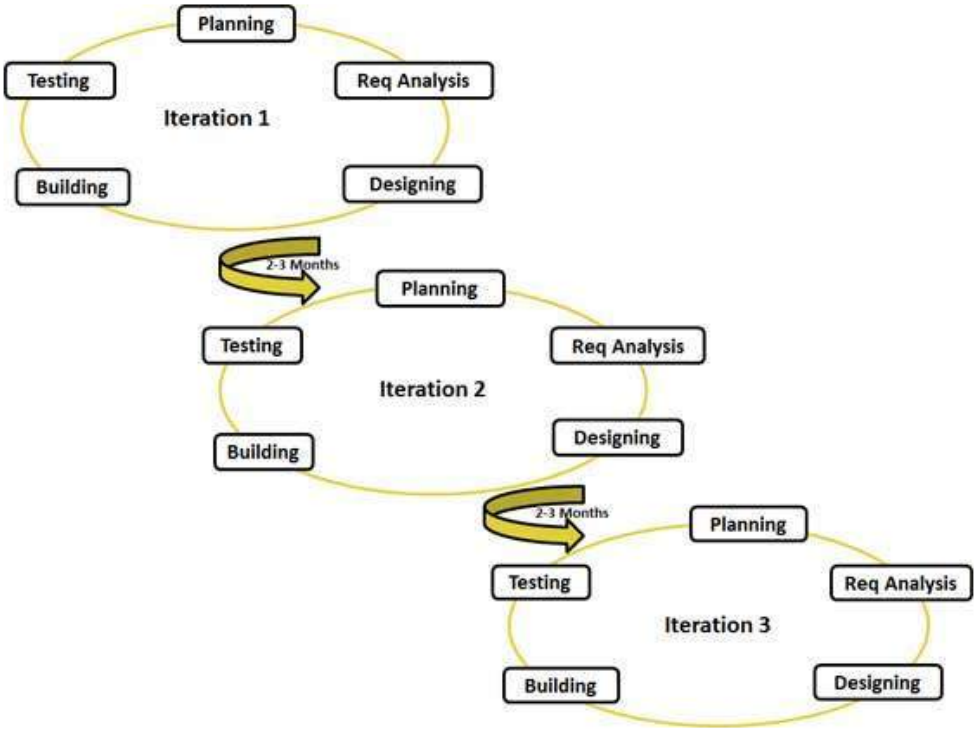

Figure 3.1: Graphical illustration of the Agile Model (tutorialspoint, 2016)

breaking projects down into little bits of user functionality called user stories, prioritizing them, and then continuously delivering them in short two week cycles called iterations.

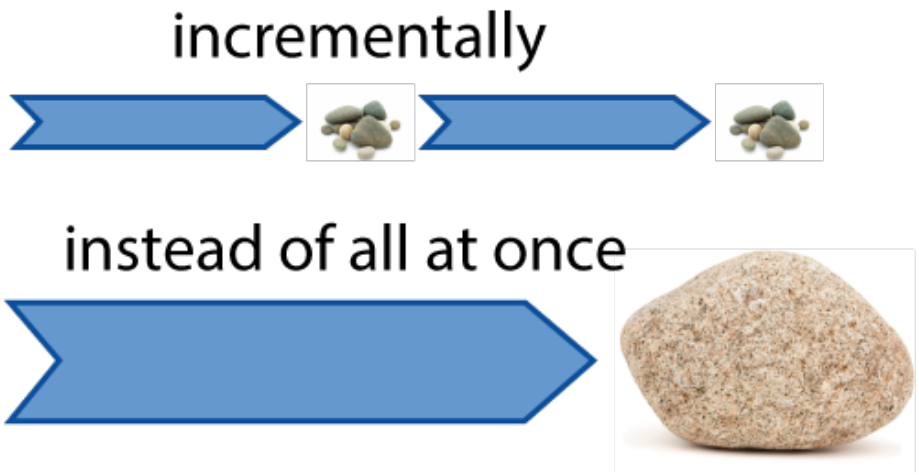

Figure 3.2: Increments of the Agile Model (agile in a nutshell, 2016)

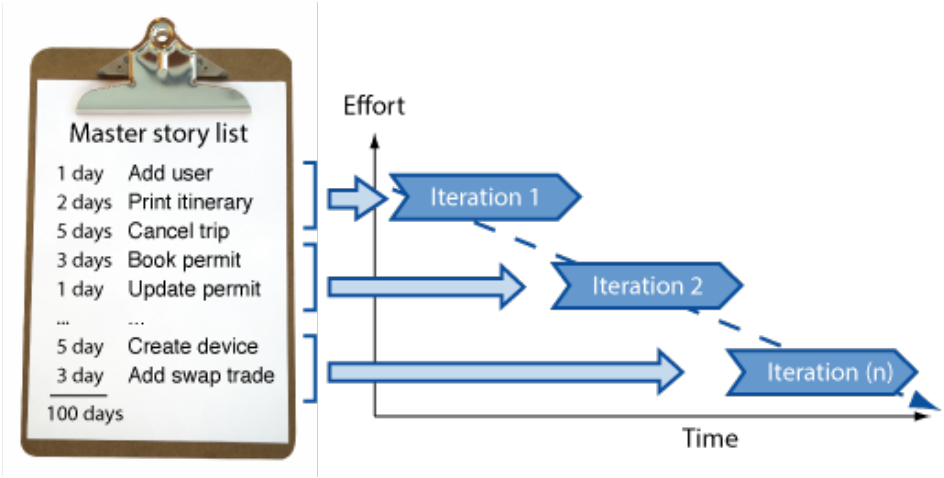

Figure 3.3: Iterations of the Agile Model (agile in a nutshell, 2016)

3.1.2 How does it work?

At its core, Agile does the same thing you and I do when faced with too much to do and not enough time. Then, using Agile estimation techniques, you size your stories relatively

to each other, coming up with a guess as to how long you think each user story will take. Like most lists, there always seems to be more to do than time allows. So you ask your customer to prioritize their list so you get the most important stuff done first, and save the least important for last. Then you start delivering some value. You start at the top. Work your way to the bottom. Building, iterating, and getting feedback from your customer as you go. Then, as you and your customer starting delivering, one of two things is going to happen. You'll discover:

You're going fast enough. All is good. Or, You have too much to do and not enough time.

At this point you have two choices. You can either a) do less and cut scope (recommended). Or you can b) push out the date and ask for more money.

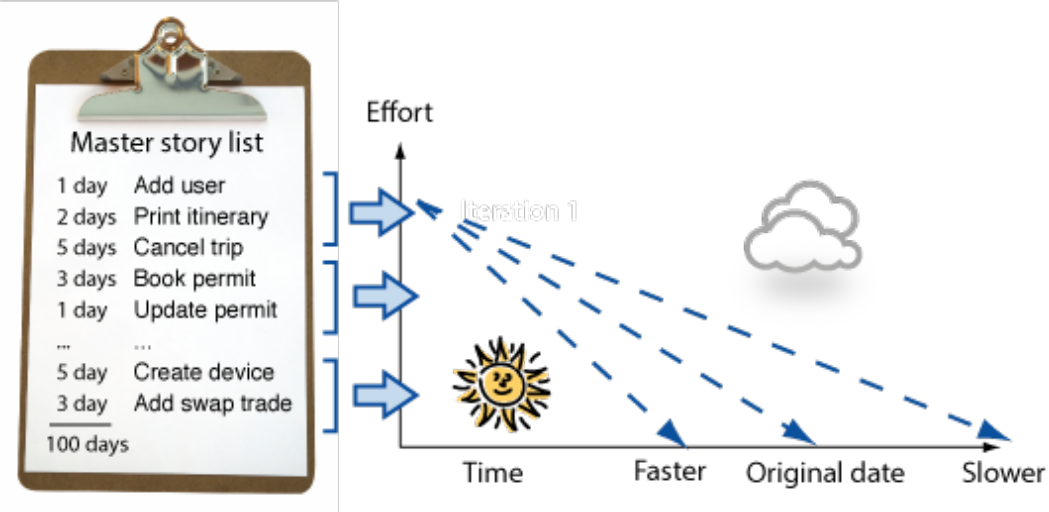

Figure 3.4: Making a list (agile in a nutshell, 2016)

3.1.3 How is it different?

Analysis, design, coding, and testing are continuous activities

You are never done analysis, design, coding and testing on an Agile project. So long as

there are features to build, and the means to deliver them, these activities continue for the duration of the project.

3.1.4 Agile vs Waterfall

Traditional Waterfall treats analysis, design, coding, and testing as discrete phases in a software project. This worked OK when the cost of change was high. But now that it's low it hurts us in a couple of ways. First off, when the project starts to run out of time and money, testing is the only phase left. This means good projects are forced to cut testing short and quality suffers. Secondly, because working software isn't produced until the end of the project, you never really know where you are on a Waterfall project. That last 20% of the project always seems to take 80% of the time.

3.2 Data Collection Methods

3.2.1 Internet Search

Discusses where I obtained my information

3.2.2 Supervisor Input

Discussion on how to store the encrypted data in tables

3.2.3 Journals in Library

Journals which were read and relevant to this project

3.3 Method of Analysis

3.3.1 Formulation of Where to Start

Researching the title of the project

3.3.2 Early System Implementation

This project was linked to an assignment which helped in my progression

3.3.3 Review of Literature

Undertaking a literature review aided with making comparisons of other systems produced

3.4 Summary

Summary with all terms discussed within the chapter

Chapter 4

Implementation - ”Building the solution”

4.1 Introduction

This chapter is a walkthrough of the steps which describe the construction of the application.

4.2 Terminal

4.2.1 Command Line Instructions

As this application was centred towards security and being secure as the data it would hold would need to be kept safe. Therefore it made sense to focus on a good login with authentication and authorisation. To start working with Symfony, one needs to setup the Symfony enviroment through an installation process before Symfony applications can be created. Instructions for this can be found on the SensioLabs Symfony website. Navigating to the Documentation page. In there can be found Chapter 1 which has the Setup instructions under the Get Started dropdown menu. They explain the different ways for installing and setting up the Symfony framework for both Mac OS and Windows. Along with some troubleshooting ideas if there are any problems with the installation. This application was built on a Mac OS so the instructions would vary slightly due to the command line instructions used. Using the installer made it easy to create this application with Symfony and only needed to be done once as it was installed globally on the machine.

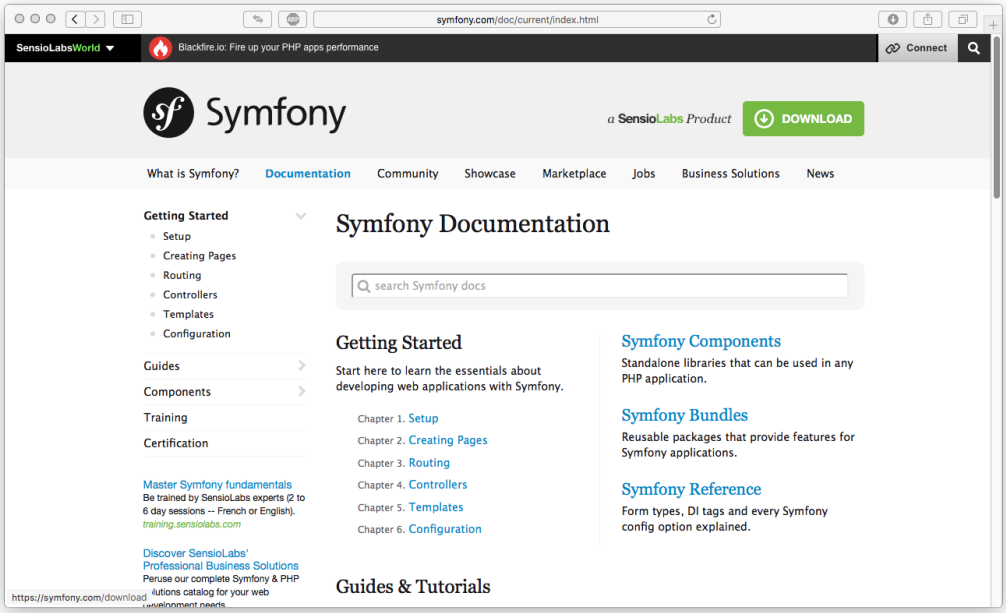

Figure 4.1: Symfony Documentation

Figure 4.2: Symfony Installation Setup

With this completed moving into the directory or environment that the application will live which was the desktop. A final command in the terminal window was issued. This time starting with symfony new and by giving a project a name of choice thereafter. In this case the name COMPH4021-Project was used. The project was based on the current version of Symfony which is version 3.2.8. However, other versions can be specified after the project name in the terminal window. Once this part was completed. All required components were downloaded into a project folder with the name of which was given. The components are a set of files and directories which form the web application which use the Symfony libraries. The installer also carries out a check to make sure all requirements are met. If requirements are not all met a list is generated which provides the changes that are needed. In this case no changes needed to be made.

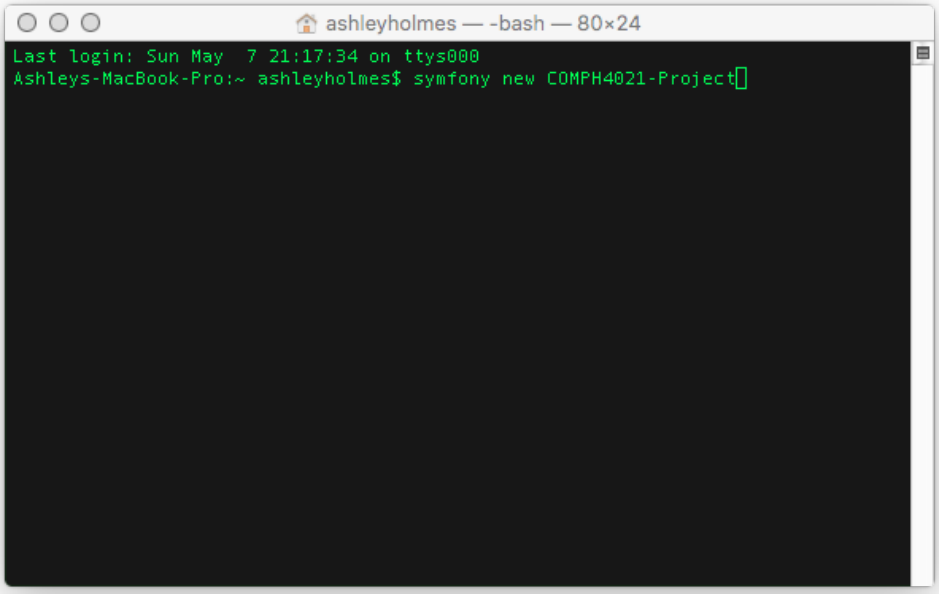

Figure 4.3: Symfony Application Setup

The below figure 4.4 displays the command issued to download the project folder and following that in figure 4.5 one can see that the project is being prepared and where it will be stored. In this case it was stored in /Users/ashleyholmes/Desktop/COMPH4021-Project.

Figure 4.4: Terminal Window Top

Figure 4.5: Terminal Window Bottom

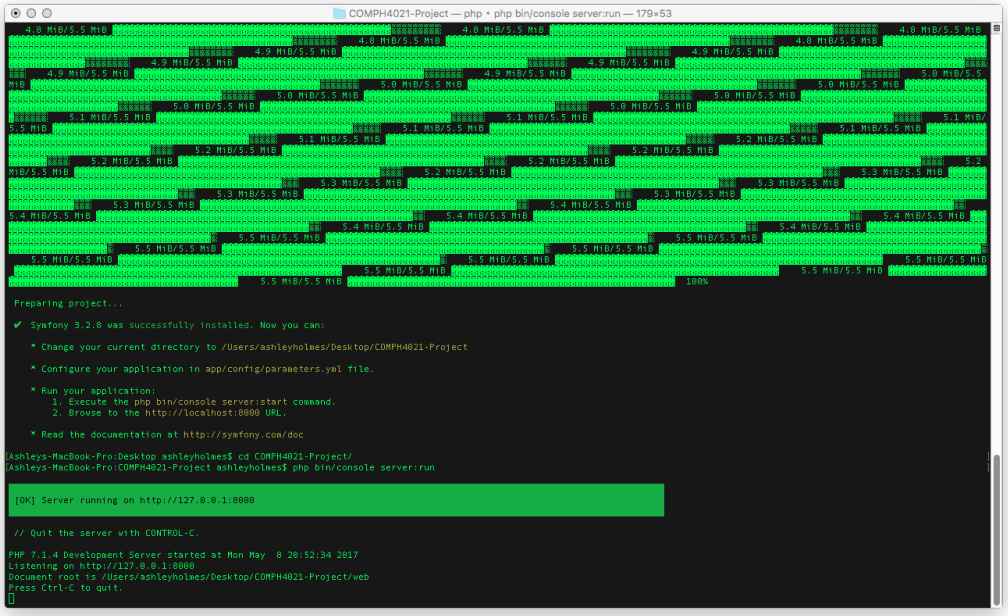

Figure 4.6: Php Server Run

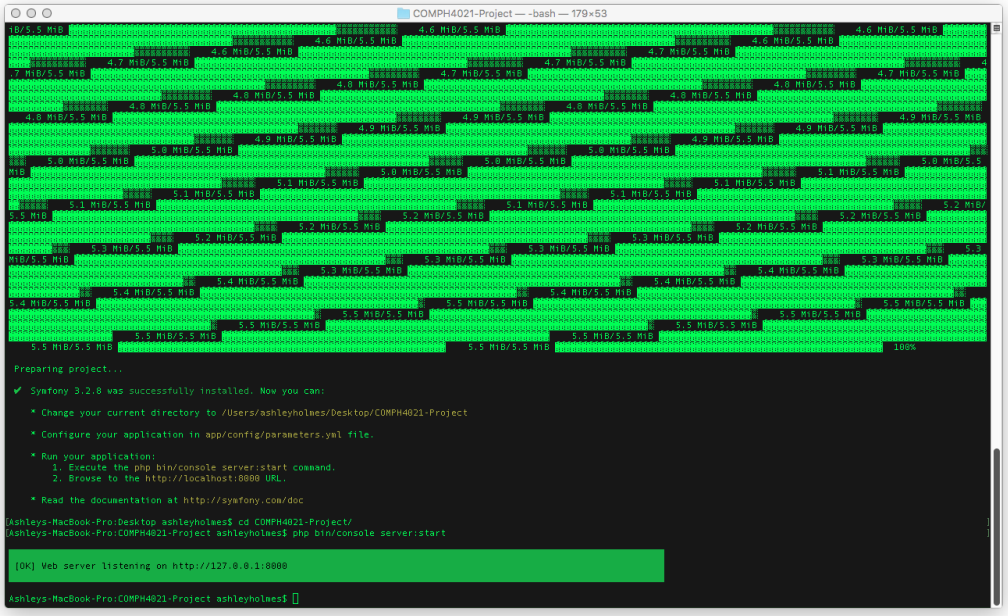

Figure 4.7: Php Server Start

The next step would be to change directory into the COMPH4021-Project directory as this is where the built in Php server needs to be run from. NGINX and Apache may be used as alternatives however, since the Php server is built in. It makes development much easier. Executing the following command php bin/console server:run starts the server. However, once issuing this command the open terminal window would now need to remain out of use while the server is running. One can use a separate terminal window or open a new tab to issue any addition commands which are needed or make use of the PhpStorm terminal window. To run other processes in the background, issuing a php bin/console server:start will make it possible to execute commands in the same window which was done here. The difference can be seen in figure 4.6 and figure 4.7.

4.3 Browser

4.3.1 Deploying the Application

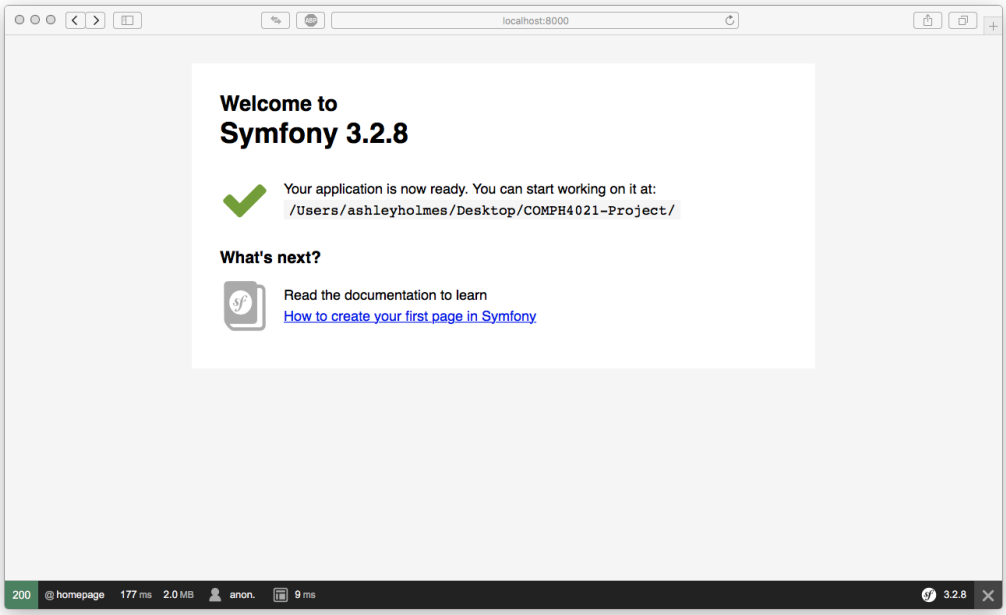

Figure 4.8: Symfony Browser

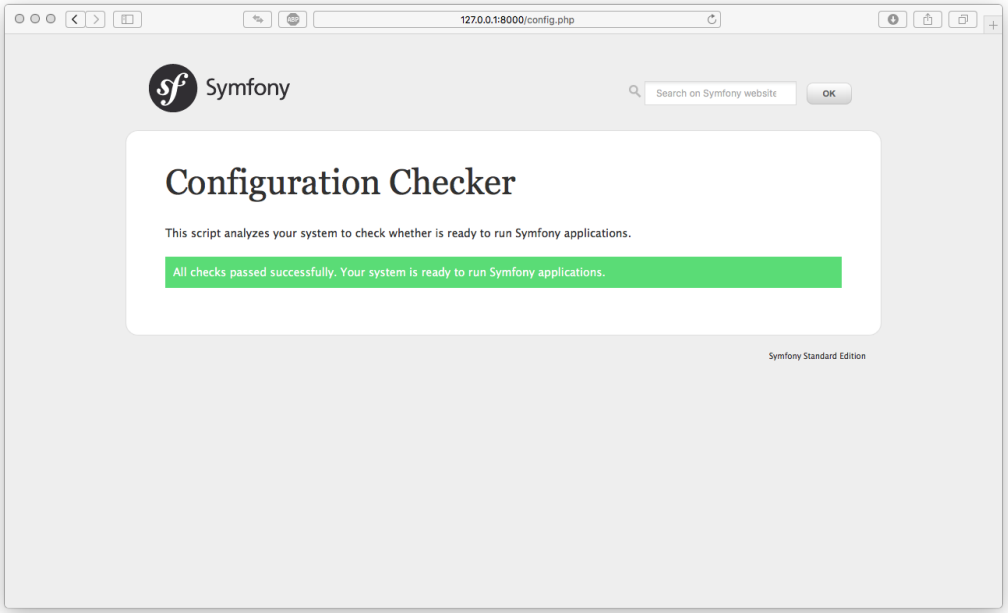

Figure 4.9: Configuration Checker

Now that the configuration phase has been completed one now navigates to the browser and using the URL http://localhost:8000 as shown in the terminal window in figure 4.5 under the Run your application heading. This brings up the following page in figure 4.8. It is being executed by the Symfony framework from the files inside the project folder. The code is depicted in figure 4.13. In the bottom of the window is the web debug toolbar which is in a maximised position and can be minimised by clicking on the X in the right hand corner. This often offers better visibility when developing. If the mouse is used to hover over the toolbar it will display information such as routing, controllers which were executed, time it took to load the page, which way the user is authenticated on the page and more debugging information and a link to the resources and documentation as shown in figure 4.12. Clicking on the icons will give much more information. The URL http://127.0.0.1:8000/config.php would show the user the instructions needed for further configuration. This is reference to figure 4.9.

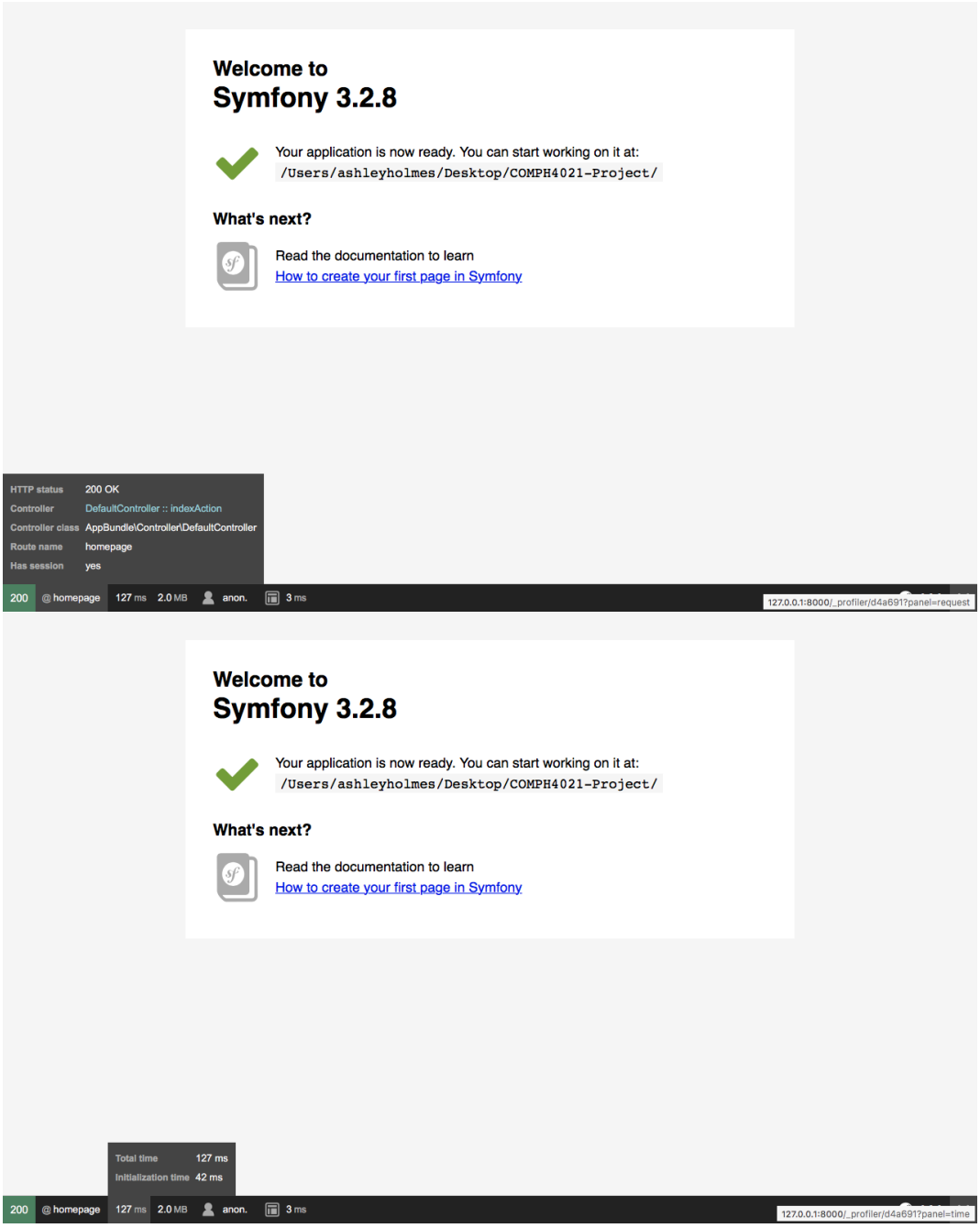

Figure 4.10: Web Debug Toolbar and Profiler Extended

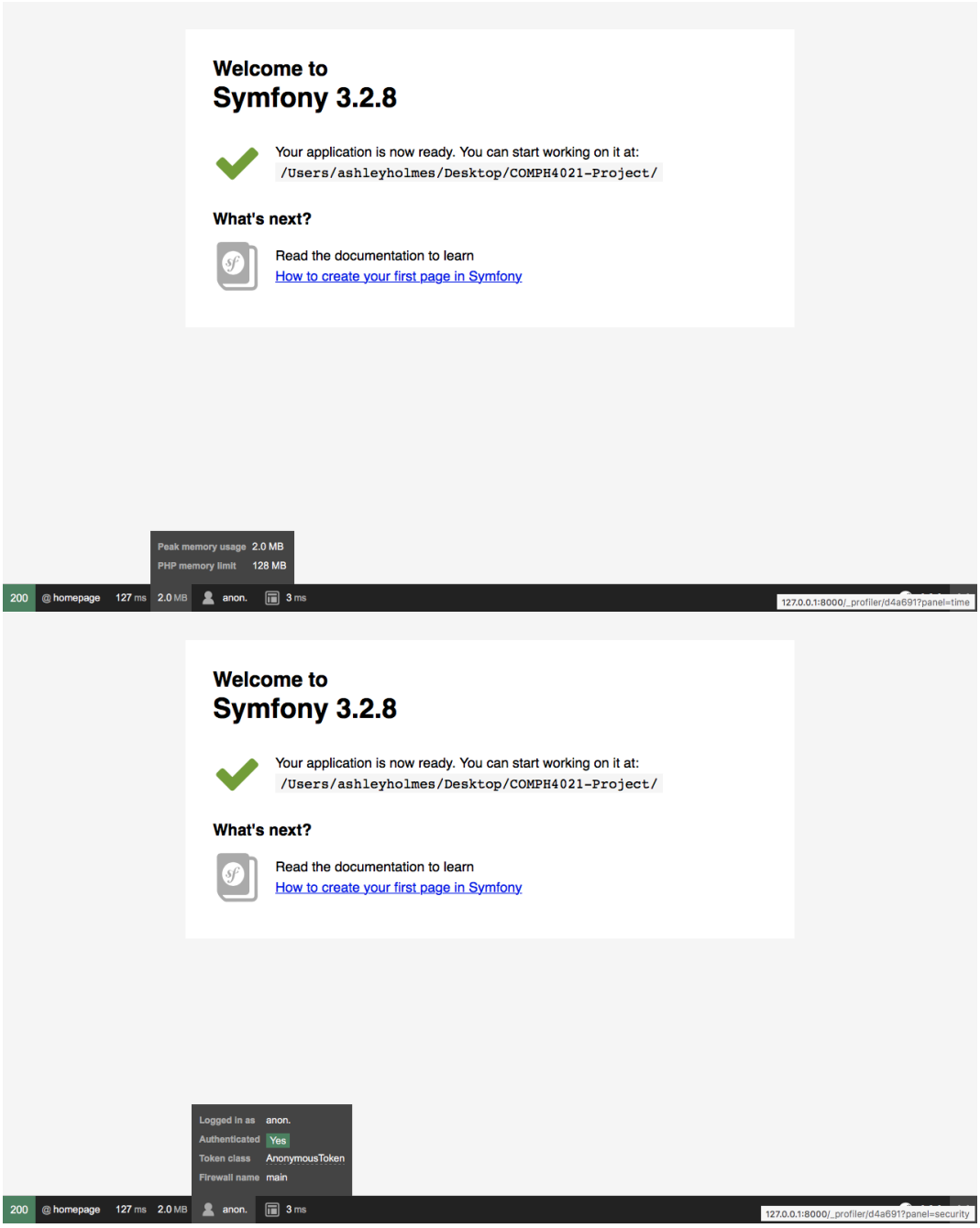

Figure 4.11: Web Debug Toolbar and Profiler Extended

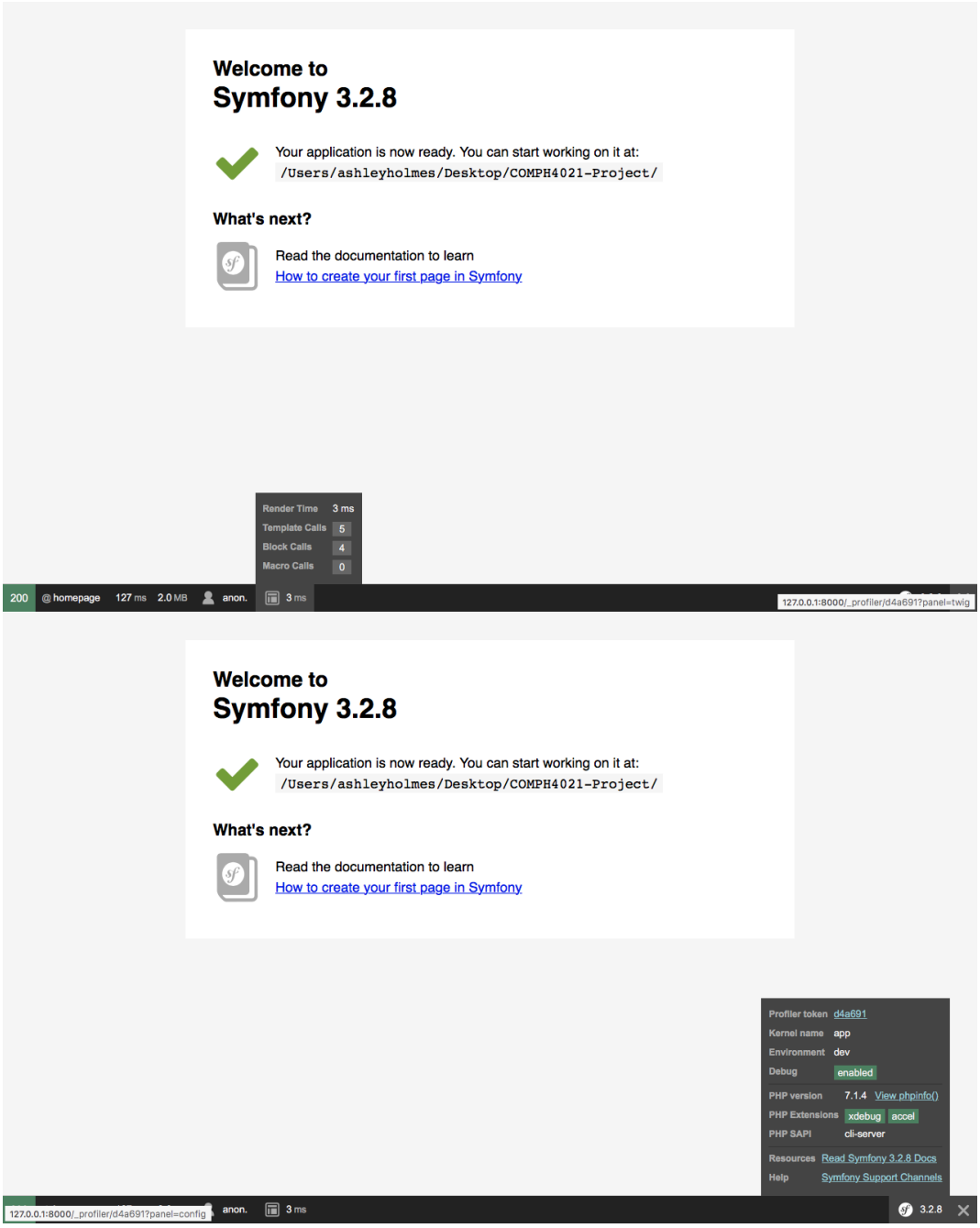

Figure 4.12: Web Debug Toolbar and Profiler Extended

Figure 4.13: Web Debug Toolbar and Profiler

4.4 IDE

4.4.1 PhpStorm IDE for PHP

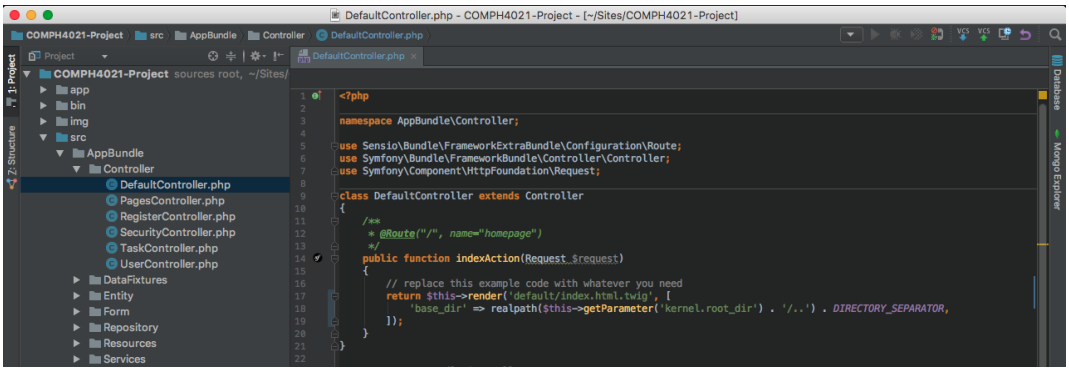

Figure 4.14: Default Controller

Most of the files live in src/AppBundle. Looking at the controller called Default Controller in the below figure 4.14. This controller class defines what is seen in figure 4.8. It renders the Symfony Welcome Page. Take note of the @Route(”/”, name=”homepage”) annotation on line 12. It matches the route in figure 4.12.

Chapter 5

Implementation of the System

5.1 Implementation Principles

5.1.1 Object-Oriented Approach

How OO aided the system

5.1.2 Design Patterns

MVC withing the Netbeans IDE

5.1.3 Choice of Language

Java over PHP

5.2 Stages of Admin Implementation

5.2.1 Login

Discuss the login procedure

5.2.2 Administration

Discuss the Administation side

5.2.3 Subsection header 3

fdsdfsdfds

5.3 Stages of User Implementation

5.3.1 Subsection header 1

fdsdfsdfds

5.3.2 Subsection header 2

fdsdfsdfds

5.3.3 Subsection header 3

fdsdfsdfds

5.4 Design

5.4.1 Subsection header 1

fdsdfsdfds

5.4.2 Subsection header 2

fdsdfsdfds

5.4.3 Subsection header 3

fdsdfsdfds

Chapter 6

Testing and Evaluation

6.1 Introduction

Introduction into the testing

6.2 Tests Conducted

This will include do the tables work, checking encryption etc. Storing the data.

6.3 Algorithms

Algorithms used to randomise the tables. And colony, traditional. The FisherYates shuffle. The Knuth FisherYates shuffle

6.4 Summary

Summary of findings

Chapter 7

Conclusion and Future work

7.1 Contributions

Contributions of this project towards Faculty and the affect on the student

7.2 Limitations

Limitations of project

7.3 Future Work

Integrate into an undertaking currently being deployed at DCU called GURU

7.4 Data Collection

Data analysis performed and exploration. As to who has submitted their examination papers

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Appendices

Appendix A
Web Application Login Screen

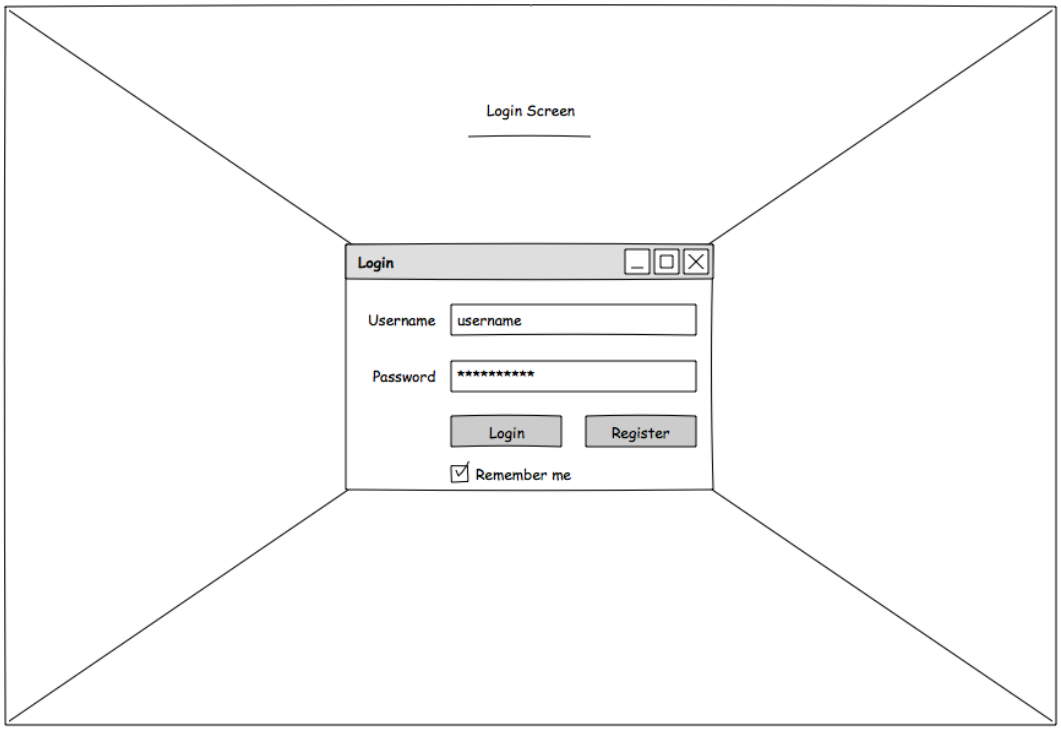

Figure 1: Graphical illustration of the Login Screen

Appendix B
Web Application Question Entry

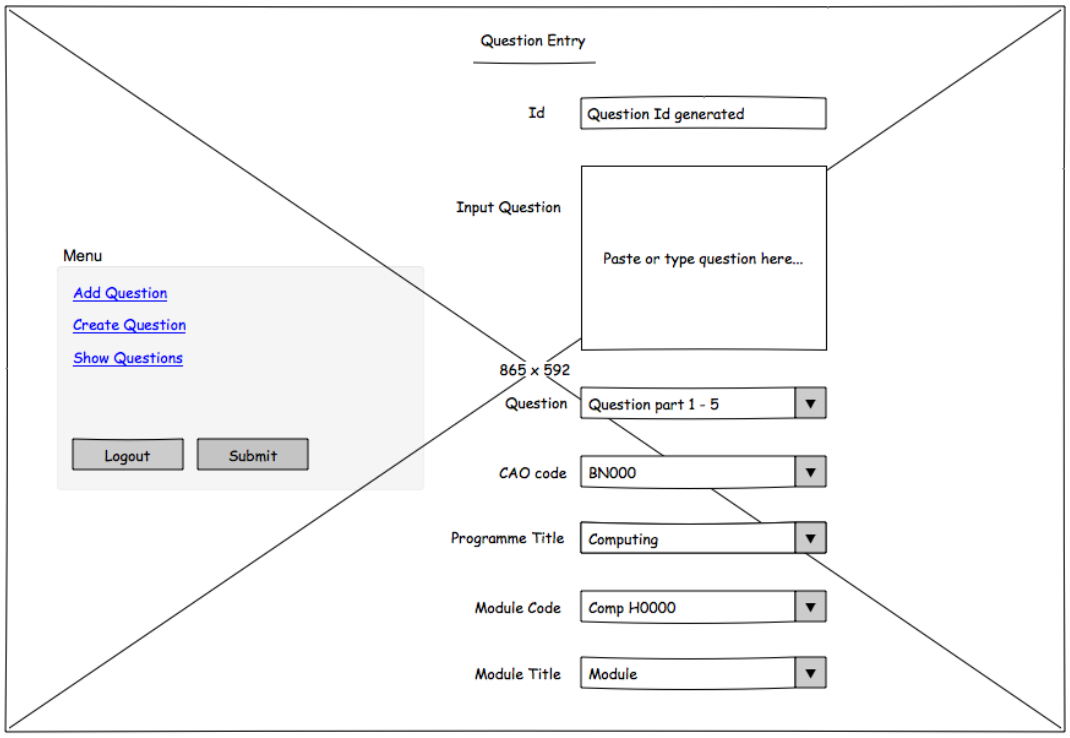

Figure 2: Graphical illustration of the Question Entry

Appendix C
Generate a Question

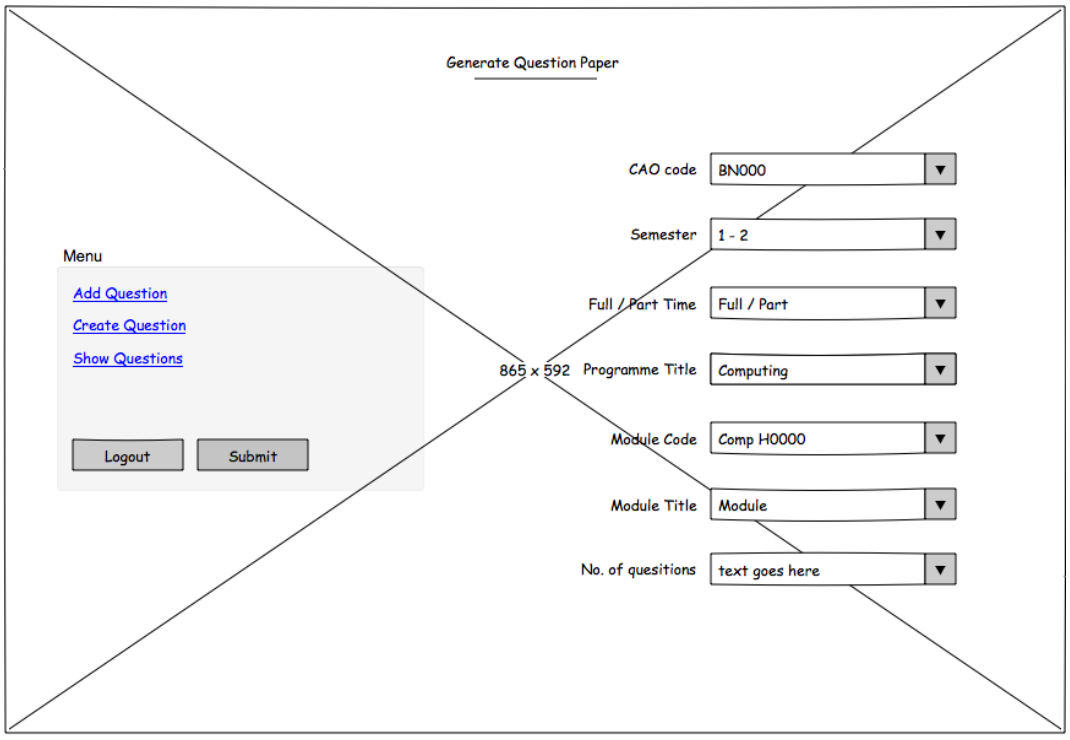

Figure 3: Graphical illustration of the Generate a Question Paper

Appendix D

Show questions

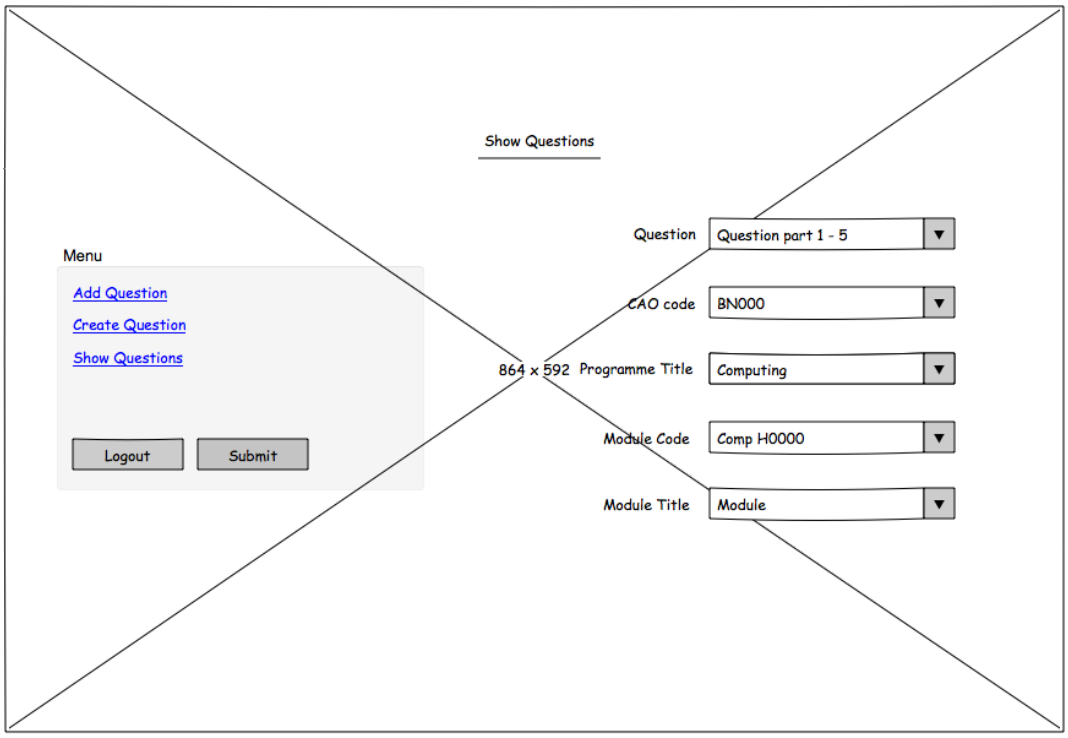

Figure 4: Graphical illustration of the Menu List to view the Questions

Appendix E
Show

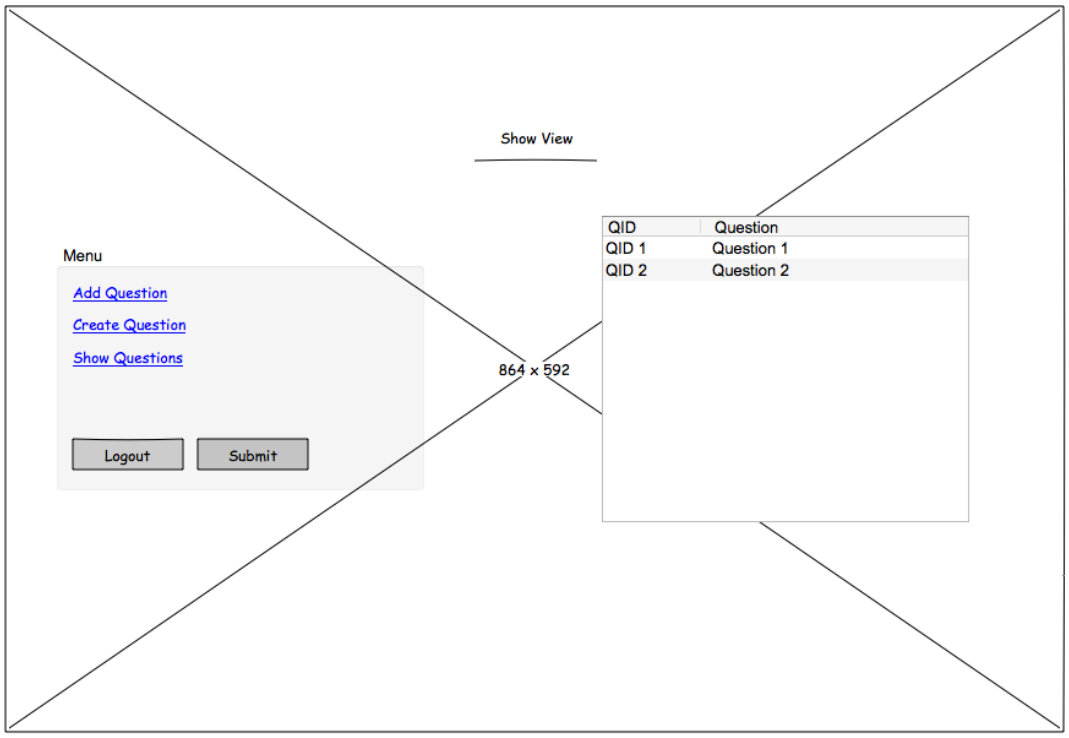

Figure 5: Graphical illustration of the Show list