
# Collaborative Platform

## Cloud Computing Report

## M.Sc. Software Engineering for Technical Computing

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## Abstract

This report has been compiled based on the work carried out using Amazon Web Services (AWS) and the WordPress CMS to build a website on the cloud. The purpose is to deploy a website on the AWS cloud that has user accounts for Teachers, group of 2/3 students, a document repository that provides revision control and measure against data loss. A description of the design approach taken for the website with some examples are provided in this report. The website will then be then be tested, a test plan is provided below in this report to determine that the website meets the acceptance tests criteria.

# Table of Contents

# 1. Introduction

The purpose of this report is to provide the process used within Software Engineering to design, develop, test, and implement a website on the Cloud. A website has been developed in AWS using the WordPress CMS to help a team of teachers and group of students to be able to collaborate on assignments as class notes. A breakdown of the user requirements has been provided in this report below alongside a test plan for the website. The design will include all the plugins that will be used for the website and the functionalities of those plugins will be described. Moreover, a comparison has been made between two CMS', i.e Drupal and WordPress and what are the challenges faced when installing those CMS' on the AWS cloud. There are some assumptions that have had to be made based on the required functionality, these assumptions are clearly stated in the report below alongside with the reason for making those assumptions.

# 2. Problem Statement

The task provided is to deploy a website on the AWS cloud using a CMS of choice, although a suggestion has been made to use Drupal due to ease of use and the open source nature. The problem has been stated as a requirement of collaborative platform where students and teachers can share class notes and student coursework. Furthermore, it is expected that there will be different accounts for Teachers and Students in groups of 2/3 and repository will be required where documents can be shared across groups and lecturers. It is possible to save the documents in their native format or convert them into the PDF format to be viewed by the users.

# 3. Project Plan

## Website Development

Cranfield University
Aman Makkar

Project Start Date: 29/01/2021

Scrolling Increment: 0

Legend: On Track | Low Risk | Med Risk | High Risk | Unassigned

| Milestone Description | Category | Assigned To | Progress | Start | No. Days |
|---|---|---|---|---|---|
| **Project Start** | | | | | |
| Set Up Environment | Goal | Aman | 100% | 29/01/2021 | 5 |
| Scope | Goal | Aman | 100% | 03/02/2021 | 2 |
| **Requirements** | | | | | |
| Identify Requirements | Goal | Aman | 100% | 04/02/2021 | 3 |
| **Develop Website** | | | | | |
| Identify available plugins | Goal | Aman | 100% | 07/02/2021 | 5 |
| Develop Website | Milestone | Aman | 100% | 11/02/2021 | 14 |
| **Testing** | | | | | |
| Develop test plan | Goal | Aman | 100% | 25/02/2021 | 4 |
| Carry out testing | Milestone | Aman | 100% | 01/03/2021 | 2 |
| **Report** | | | | | |
| Gather the documents | Goal | Aman | 100% | 03/03/2021 | 1 |
| Complete the Report | Goal | Aman | 100% | 20/02/2021 | 16 |
| Submit the report | Milestone | Aman | 100% | 08/03/2021 | 1 |

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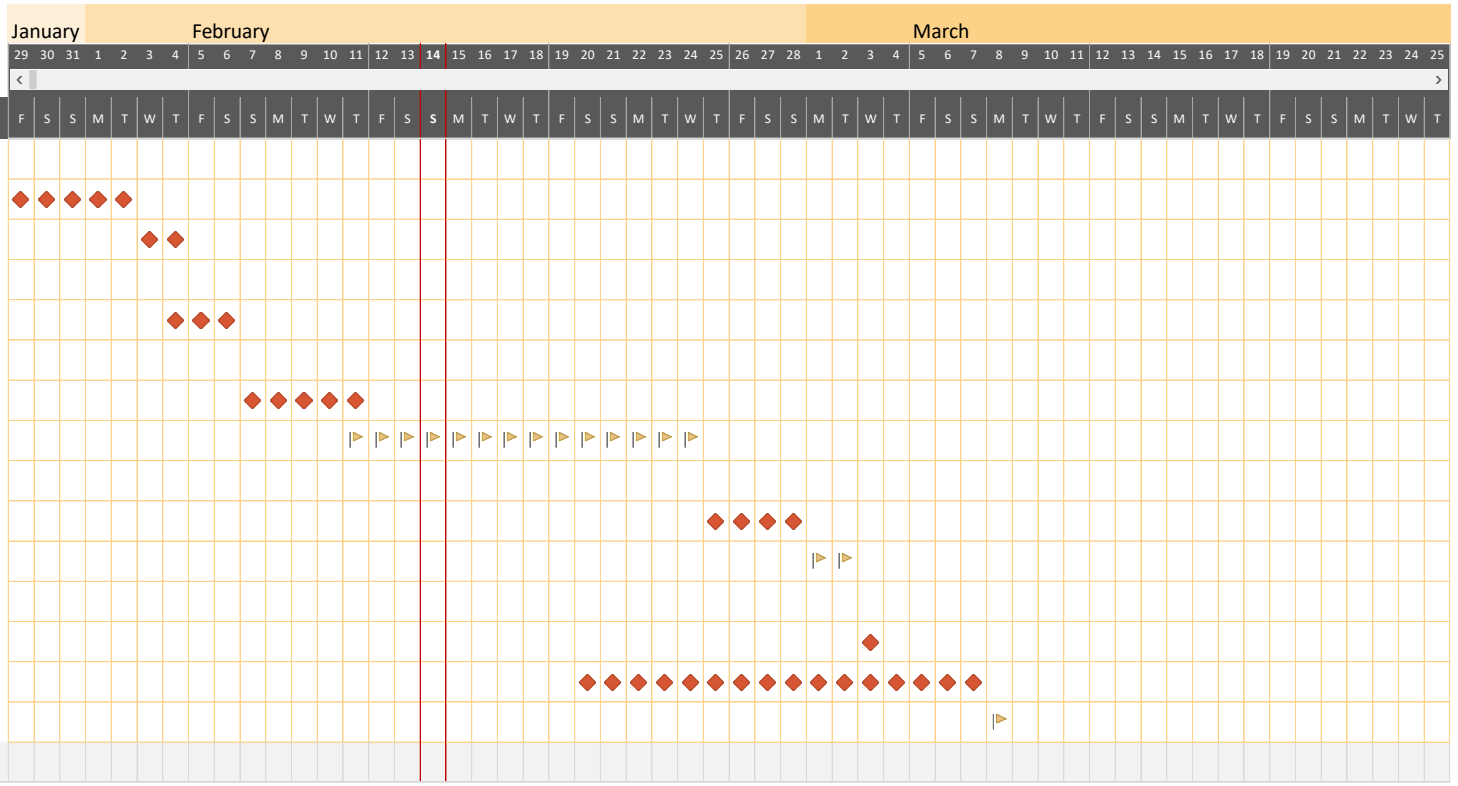

# 4. Website Requirement Specification

This part of the report specifies the requirements for the website deployed on the AWS cloud, for the collaboration between teachers and students.

## 4.1. Purpose

This part of the report will provide a breakdown of the system and user requirements and the work that will be carried out to deploy the website.

This will consist of the following sections:

- **Chapter 4: Introduction**

  Identifies the purpose of this document and the context of the website to which this requirements document is written.

- **Chapter 5: Project Description**

  Breakdown of the project description and requirements.

- **Chapter 6: Website Features**

  Provides website features breakdown.

- **Chapter 7: Non-Functional Requirements**

  Provides functional requirements

## 4.2. Document Conventions

The use of "shall", "should", "must", "will" and "may" within the SRS observe the following rules:

• The word SHALL in the text denotes a mandatory requirement of the SRS. Departure from such a requirement is not permissible without formal agreement.

• The word SHOULD in the text denotes a recommendation or advice on implementing such a requirement of the document. Such recommendations or advice are expected to be followed unless good reasons are formally stated and accepted for not doing so.

• The word MUST in the text is used for legislative or regulatory requirements (e.g. Health and Safety) and shall be complied with.

• The word WILL in the text denotes a provision or service or an intention in connection with a requirement of the SRS.

• The word MAY in the text denotes a permissible practice or action. It does not express a requirement of the SRS.

## 4.3. Intended Audience and Reading Suggestions

This document is intended for the developer who will be building the website as well as the lecturer who will be assessing the work.

## 4.4. Product Scope

The purpose of building this website is so that teachers and students of a university can share class notes as well as the assignments. The website must have the capability of providing separate accounts for teachers as well as students and they should be able to access the repository of the

groups to which they are assigned. The website will be deployed on the AWS and should be available on a 24/7 basis with very low downtimes.

# 5. Product Description

## 5.1. Product Perspective

This will be a new website however various plugins will be used that already exist on WordPress to complete the website. The website will include the following:

- **Teacher accounts:**

  It shall include teacher accounts and provide access to the Dashboard and extra functionalities that will not be available to students.

- **Student accounts:**

  The website shall include student accounts who shall be able to share documents in the group repository as well as a general use repository.

- **Group of students:**

  The website shall include groups of 2 or 3 students who shall be able to share documents in that repository.

- **Back up:**

  The website shall provide backup options to take appropriate measures against data loss.

- **Document versioning:**

  The website shall provide the capability of versioning documents that are uploaded in the groups as well as the general repository.

## 5.2. Operating environment

Any up to date working internet explorer will be able to run this website, no extra or added capabilities are required for the user.

## 5.3. Design and Implementation Constraints

WordPress will be used on the AWS EC2 cloud to implement and deploy the website, it must be able to run on any given internet explorer. It is noted that the website shall be able to meet all the functional requirements while running in the AWS cloud.

## 5.4. Assumptions and Dependencies

Find some assumptions that have been made for the website below:

- There will be two separate kind of repositories, one to be shared only within the group members and another one to be shared by all the registered users.
- Each student will have individual login details even if they are part of a group.
- Only members of the same group can access the assigned group repository and documents.
- Revisioning of the documents will be manually carried out by the user, i.e when uploading the document on the website, the user will write in the note to determine the revision number of the document.

- The backup will be made of the entire website rather than only of the repository, the whole website will be backed up automatically after a certain time.

### 5.5. User Interfaces

- Front end Software: WordPress
- Back end Software: AWS Ubuntu Linux EC2 instance

### 5.6. Hardware Interfaces

- Any operating system with internet access
- A computer

### 5.7. Software Interfaces

| Software Used | Description |
|---|---|
| AWS EC2 Ubuntu Linux instance | AWS EC2 instance has been used to be able to deploy the website on the cloud. |
| WordPress | The Website has been build using the WordPress CMS alongside various freely available plugins. |

# 6. Website Features

## 6.1. Types of Users

The Website shall have three types of users:

- Teachers
- Students
- Admin

### 6.1.1. Description and Priority

This feature is of high priority as the students and teachers shall not have the same rights to manage the website as the Admin and Teachers should have more rights compared students such as being able to create groups and add/remove students from those groups. High priority.

### 6.1.2. Functional Requirements

The website shall allow the user to carry out the following requirements:

Req 1: All the users shall have individual login details. High priority.
Req 2: Admin shall be able to manage the website. High priority.
Req 3: Teachers shall be able to add/remove students from groups. Medium priority.
Req 4: All users shall be able to share documents. High priority.

## 6.2 Repository

### 6.2.1 Description and Priority

This feature is required to be able to upload and documents from the front end of the website. High priority.

### 6.2.2. Functional Requirements

Req 5: A repository must be available to share documents between all users. Medium priority.

Req 6: Repository shall be available to share documents within the allocated groups. High priority.

Req 7: A back up shall be available to protect against data loss (this will be carried out on a website level). High priority.

Req 8: Users shall be able to manually add version numbers to the uploaded documents. High priority.

## 7. Non-Functional Requirements

- The website shall be able to run smoothly without any breakdowns between web pages.
- The website shall be able to run on any internet browser.

## 8. Test Plan Overview

This test plan has been created for the website of a University, the purpose of this documents is to plan, organise, execute, and manage the testing of this project. This website has been created for the users of the University which includes the employees and students to be able to share documents within a group of students and teachers.

## 9. Testing Synopsis

### 9.1. Parts to be tested

- Login pages for all the users.
- Load Documents on the website front end.
- Delete Documents from the website front end.
- Back up the website.
- Performance Testing.
- System Testing.
- Integration Testing.
- Input.
- Output.
- Configuration and Compatibility testing.

### 9.2. Systems Requirement

As this project is only to be used by the users of a University, it does not require any expensive testing hardware. This website will be tested in the following environments:

- Standard off the shelf Alienware Laptop

Intel(R) Core(TM) i7-7700HQ CPU @ 2.80GHz, 2801 Mhz, 4 Core(s), 8 Logical Processor(s).

Running Ubuntu 20.04 operating system on a 64 bit system with Chrome internet browser.

- Standard computer at Cranfield University running Windows 10 operating system on Microsoft Edge internet browser.

### 9.3. Standard/Reference Material

The website will be developed on the WordPress CMS and deployed on the Amazon Web Services cloud services.

## 10. Types of Testing

### 10.1. Acceptance Testing

Initially smoke testing will be carried out to determine if any further testing is required at this stage of the project, the purpose of the smoke test is to determine that the website works at a high level.

- The website runs on various browsers.
- The AWS is shutdown while the website is loading. The website loads without any issues when the AWS instance is restarted.

### 10.2. Feature Level Testing

#### 10.2.1. Types of Users

- All users have individual login details.
- Admin shall be able to login and make changes from the website backend.
- Teachers accounts to be tested.
- Share documents between users.

#### 10.2.2. Repository

- Test that repository is available for all groups.
- Carry out a back of the website.
- Manually add information for versioning of the documents by users.

#### 10.2.3. Integration Testing

All the pages of the website will be tested, the following table provides a breakdown.

| Test Case Objective | Test Case Description | Expected Result |
|---|---|---|
| Every page of the website is loaded | All the pages will be tested individually | To check that the website pages have the content that is expected |
| Login | Every user will be logged in individually | There should be no issues when logging in with teacher, |

| | | |
|---|---|---|
| | | student, or admin user credentials |
| Upload and Download documents | Every user can upload and download documents in a group and the shared repository | Every user will be able upload and download documents with no issues |
| Back up website | Back up the website including the repository and then reload the backed-up data | The backup will be able to reload the deleted document using the backed-up data |

### 10.2.4. System Testing

| Test Case Objective | Test Case Description | Expected Result |
|---|---|---|
| Usability Testing | The website will be able to run with all the necessary requirements | Purpose to demonstrate that the website is user friendly |
| Recovery Testing | The AWS EC2 will be shut down while a back up is being carried out. | The previous back up will still be available |
| Migration Testing | The Website will be run on various OS and internet browsers | The website will run and work smoothly regardless of the OS or browser |

## 11. Test Schedules and Resources

The schedule provided below is tentative and will be worked towards to be met:

- This test plan is expected to be completed by 28th of Feb 2021.
- The test execution is not expected to last more than 2 days and will commence once the tests plans have been completed. The current tentative date to begin the testing is 1st of March 2021.
- A project plan has been put together in MS Excel that is shared at the beginning of this documents.
- Time constraints can affect the completion and the quality of the website.

## 12. Test Phases and Completion Criteria

| STLC Stage | Entry Criteria | Activity | Exit Criteria | Deliverables |
|---|---|---|---|---|
| Requirement Analysis | Requirements documents available | Analyse the requirements and determine functional and non-functional requirements. | Understand all the requirements of the website | SRS document |
| Test Planning | Requirements Documents | Analyse testing approaches<br>Finalise the testing approach that is suitable | A test plan that tests all the requirements | Test plan |
| Test Case Development | Requirements Documents | Understand the CMS requirements<br>Perform smoke test | The website works as expected<br>Smoke test provides expected results | Smoke test results |
| Test Execution | Test plan and test cases | Run all the tests as per the plan | All the tests in the plan have been executed | Report with defects |

## 13. Methodology

The website will be deployed on the Amazon Web Services cloud services and the website will be built using the WordPress CMS.

To Deploy the website on the AWS, WordPress CMS must be downloaded and installed on the AWS EC2 instance. The initial plan was to use Drupal to deploy the website on AWS however, due to various bugs and versioning issues with Drupal, it was decided that WordPress will be the safer option, in order to save time and be able to complete the website within the given timeframe.

To ensure that the IP address provided to WordPress remains constant, it is essential that the AWS instance is given an “Elastic” IP address, i.e. it must remain constant if the website is in use. The reason to do this is because once WordPress has been installed, it saves the IP address of that instance. Once the AWS instance is shut down and restarted, it starts with a new IP address which causes WordPress to slow down considerably and, in most cases, not load properly. Therefore, this step must be taken when the AWS instance has been loaded along with the WordPress CMS.

Once WordPress has been installed and configured, the AWS instance DNS can be used to get to the WordPress backend, as shown in figure 1 below.

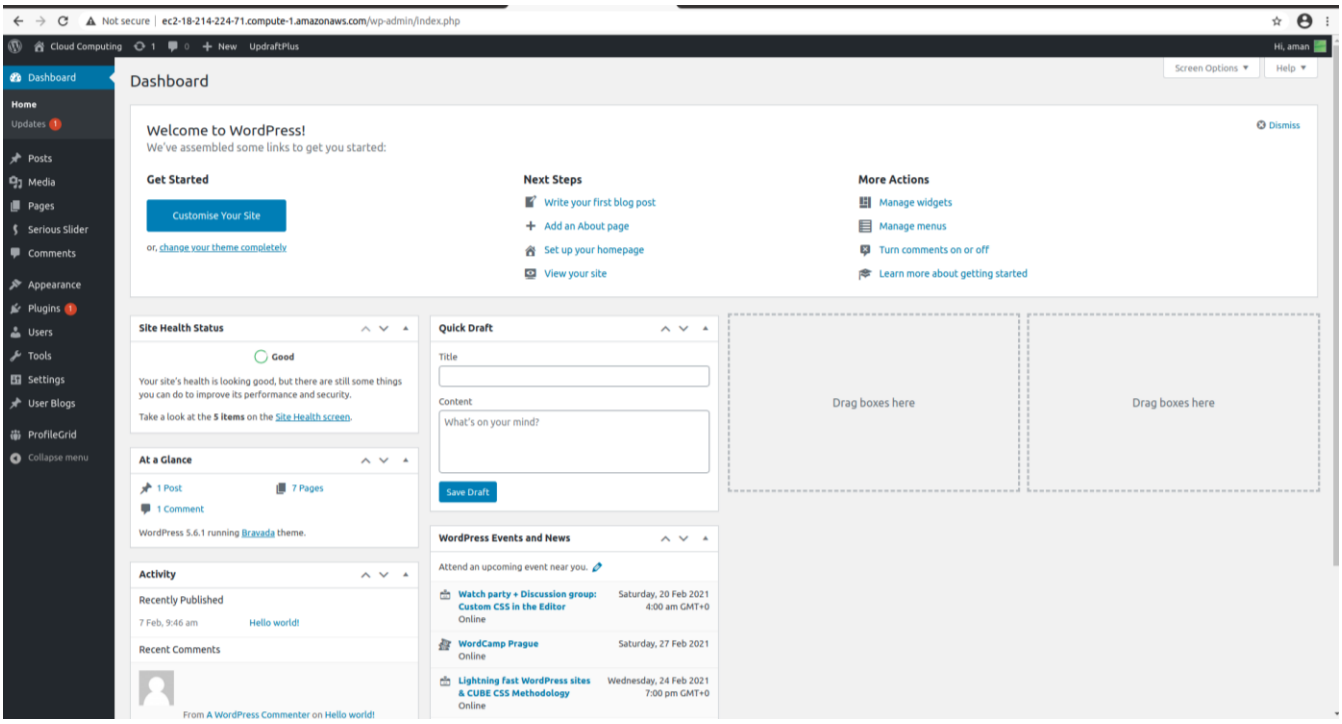


Fig 1: WordPress Backend

As can be seen in figure 1 above, the backend shows where all work to make the website can be carried out. In order to start with a website, the first thing that needs to be chosen is a theme for the website, although it can be changed later if it does not meet the requirement, having a theme shows a vision of what the developer wants the website to look and feel like. For the purposes of this project, the “Bravada” theme was used, can be seen figure 2 below.

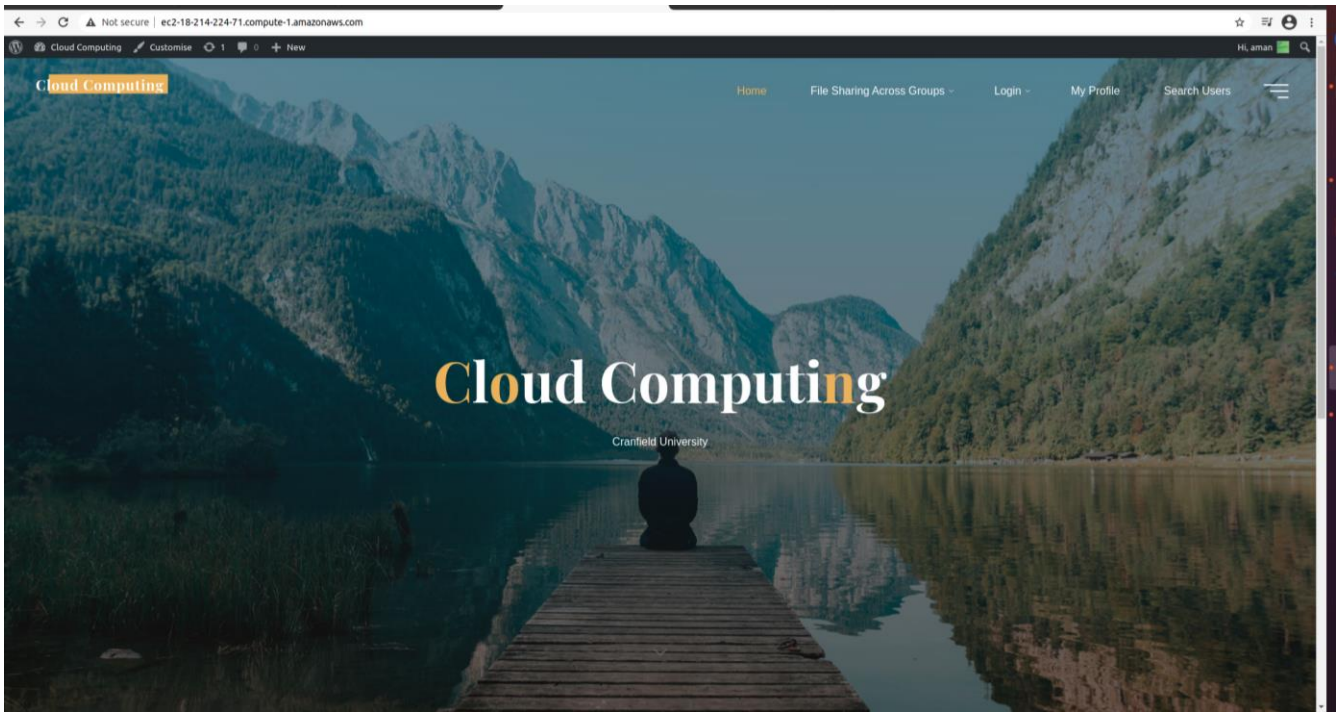


Figure 2: Bravada Theme

Once the theme for the website has been chosen and activated, functional requirements of the website can be evaluated. The first requirement for this website is to have Teacher, Student and Admin users. The WordPress backend provides a way to add users and their roles in the side menu as can be seen from the figure 3 below.

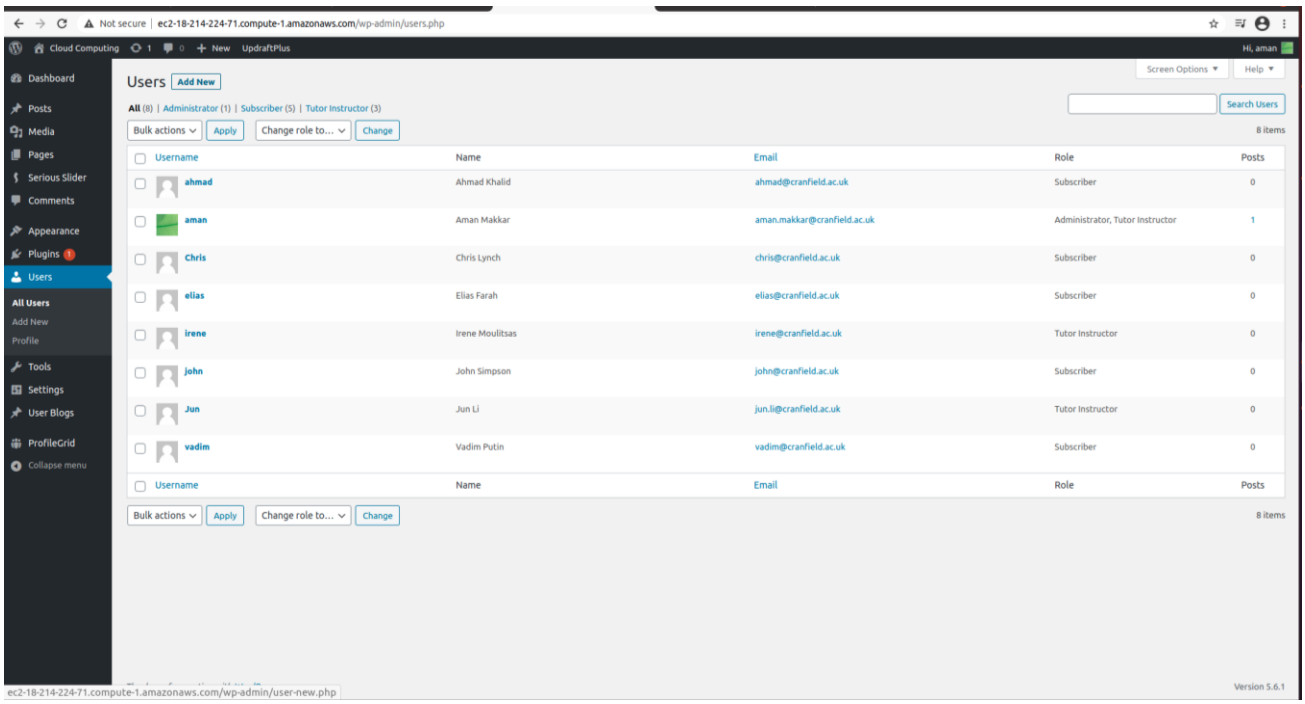


Figure 3: Add Users

## 13.1. WordPress Plugins

WordPress provides various plugins in the backend that can be used for the website. Three plugins will be used to meet all the functionalities of this website, the plugins that will be used are:

1. ProfileGrid
2. User Private Files
3. UpdraftPlus

### 13.1.1. ProfileGrid

The ProfileGrid plugin provides the capability to be able to add groups to the website, with their own group pages which are needed for this website for Groups to be able to have their own repository. Figure shows below to be able to add new groups to the website. Once the ProfleGrid plugin has been activated, some of the core pages are automatically added to the website, these can be edited or deleted if not required.

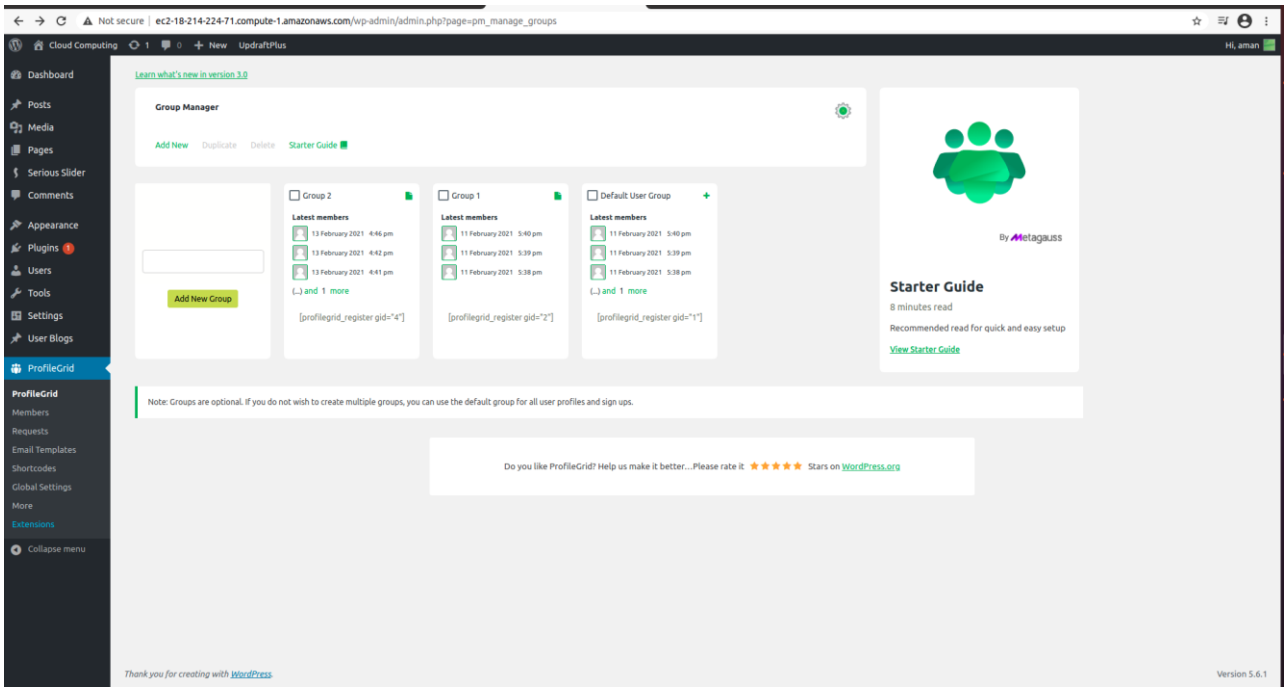


Figure 4: ProfileGrid to add new users

ProfileGrid also provides shortcodes that can be used for various other functionalities that can be useful for this website, such as providing profile pages for the users and pages specific to the groups as can be seen below in figure 5.

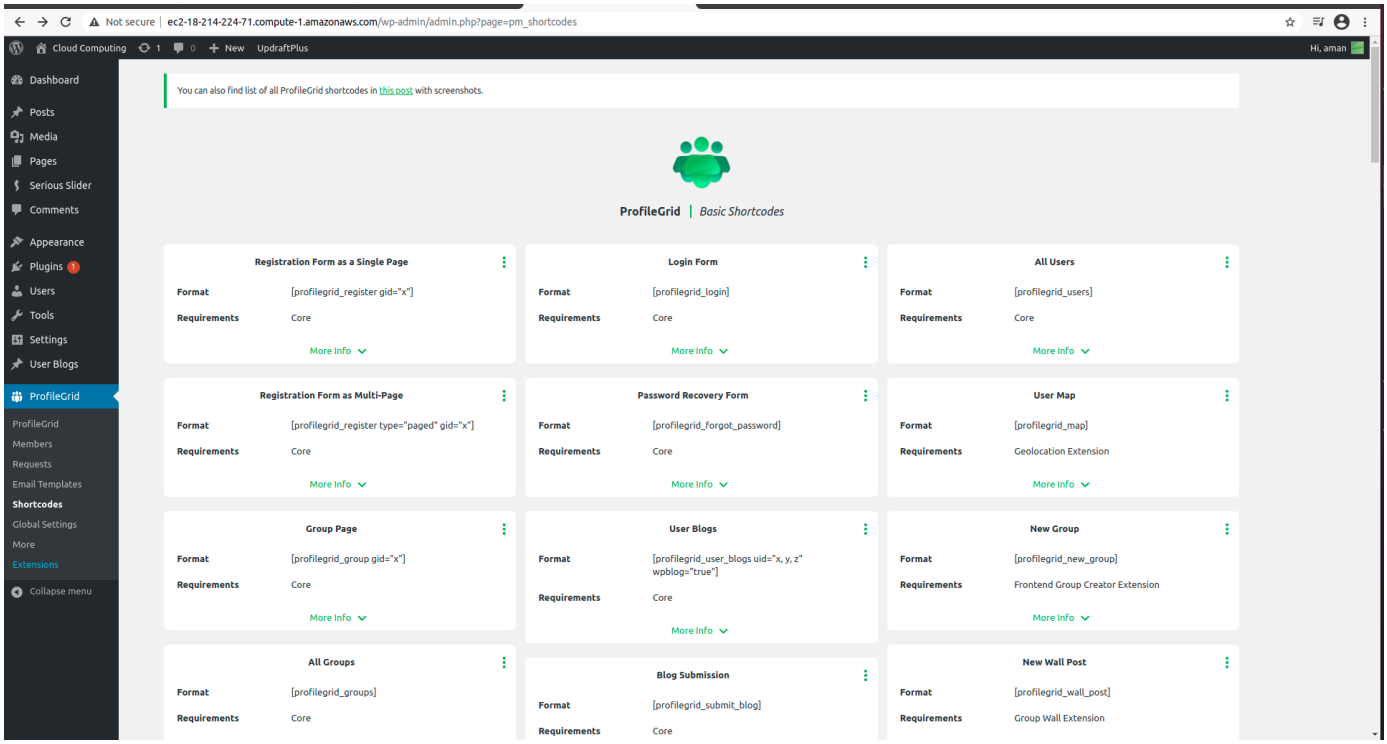


Figure 5: Shortcodes for ProfileGrid plugin

### 13.1.2. User Private Files

The User Private Files provides the capability to be able to add a repository to the website. This plugin uses shortcodes to add the repository capability to the website, this can be seen in Figure 6 below.


Figure 6: Shortcodes for User Private Files plugin

Figure 5 above provides shortcodes for both ProfileGrid and User private file plugin, the top shortcode is for the ProfileGrid plugin and it ensures that this page and repository is only available to Group 1 members. Furthermore, the bottom two shortcodes are for User Private Files plugin that add the capability to upload and download files from this page.

### 13.1.2. UpdraftPlus

The UpdraftPlus provides the capability to back up the whole website, this includes all the data in the repository. This backup data is then saved in the WordPress backend, when the new backup has been made the previous back up can be deleted and this can be seen in figure 7 below. The backup files can be downloaded directly to the local computer if it is deleted at the front end by the user by mistake. It should be noted, only the admin has access to these backups and if any of the other users require access to any of these deleted files, an email must be sent to the admin to retrieve those files.

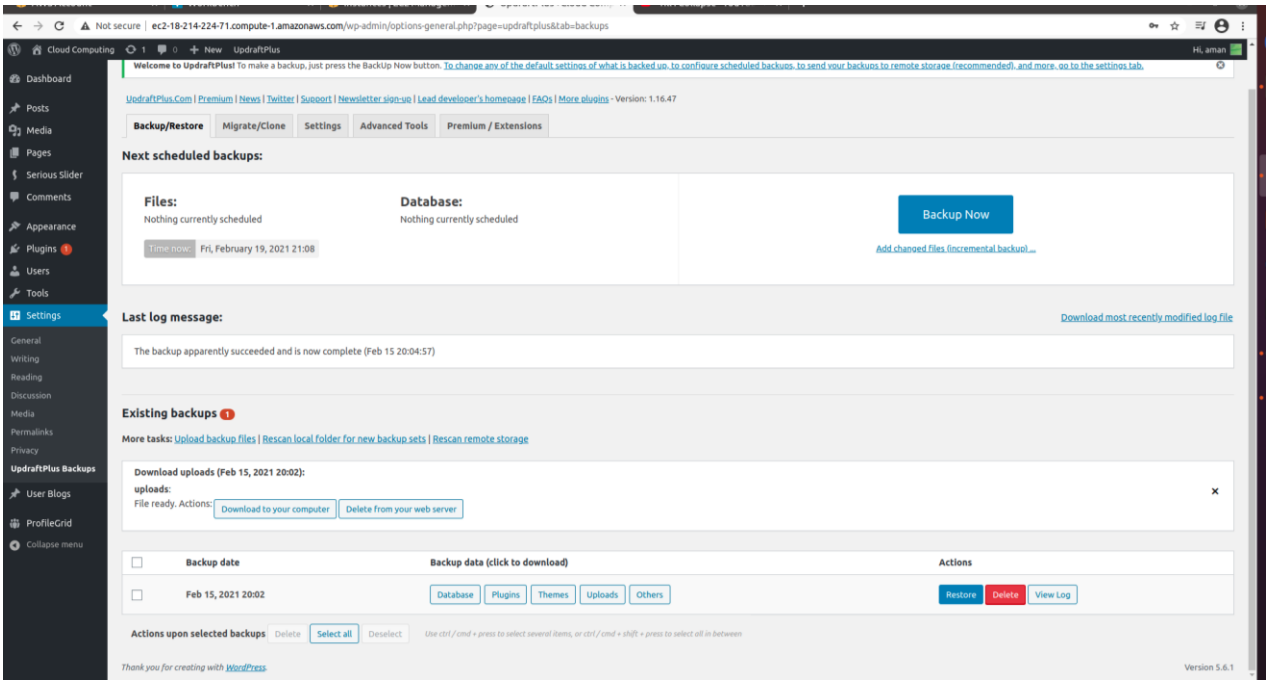


Figure 7: UpdraftPlus plugin

## 14. Using the Website

A breakdown and screenshots of how the website works is shown below, starting with the login page.

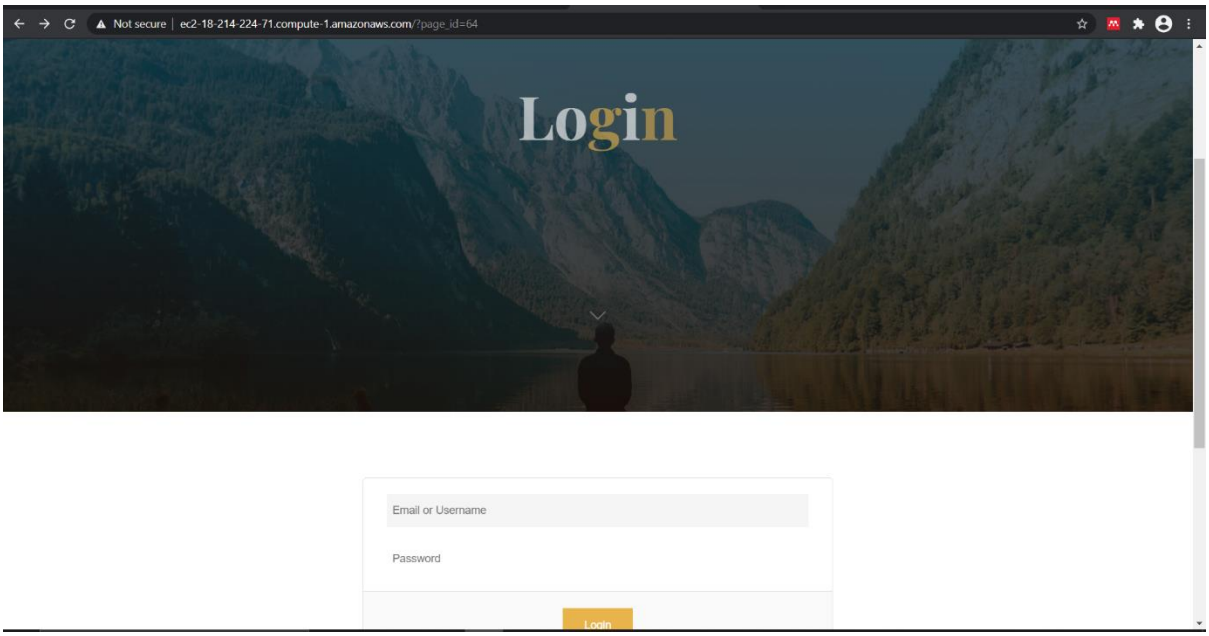


Figure 8: Login Page

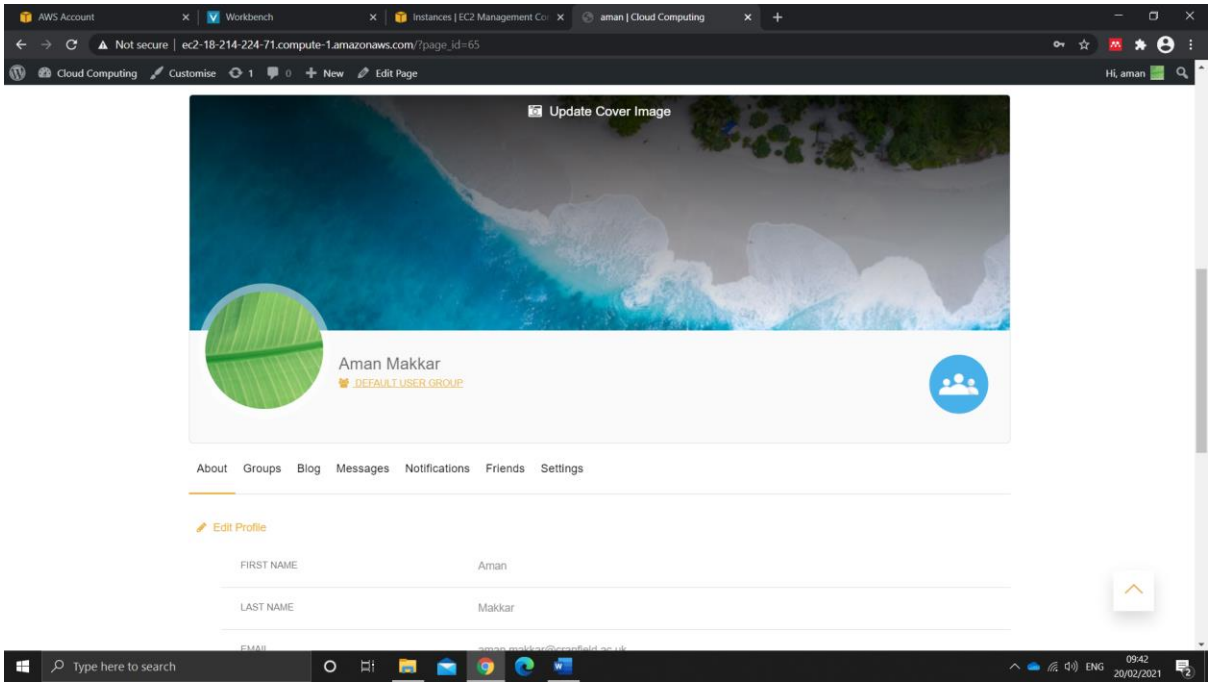


Figure 9: My Profile page after logging in

Figure 10 below shows a common repository page that can shared between all users.

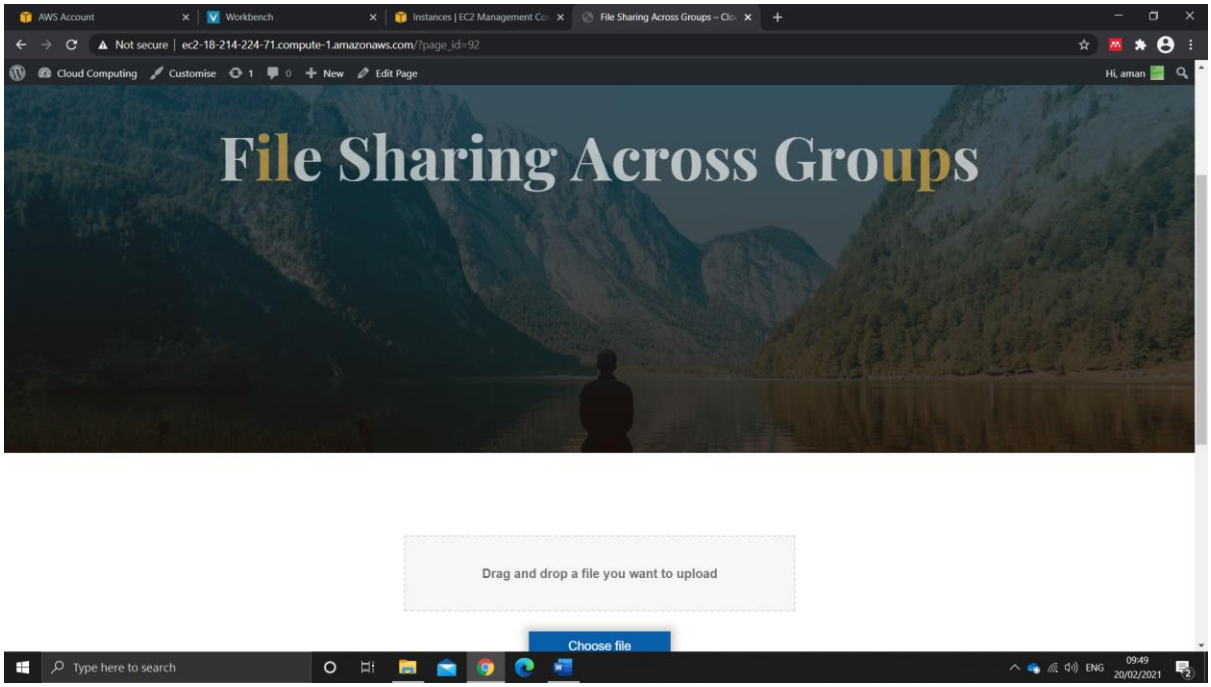


Figure 10: Shared file sharing

Figure 11 and figure 12 below shows the homepage for group 1, the figures show the group members, the lecturer leading that group and file sharing capability within the group.

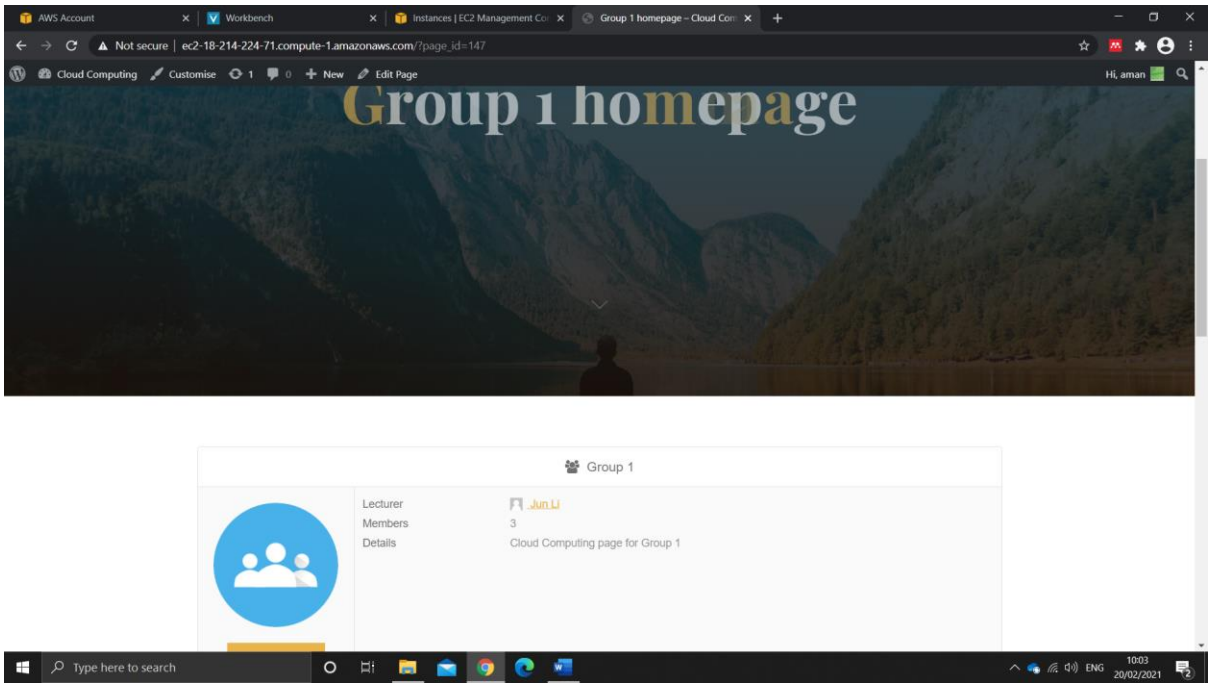


Figure 11: Group 1 Homepage

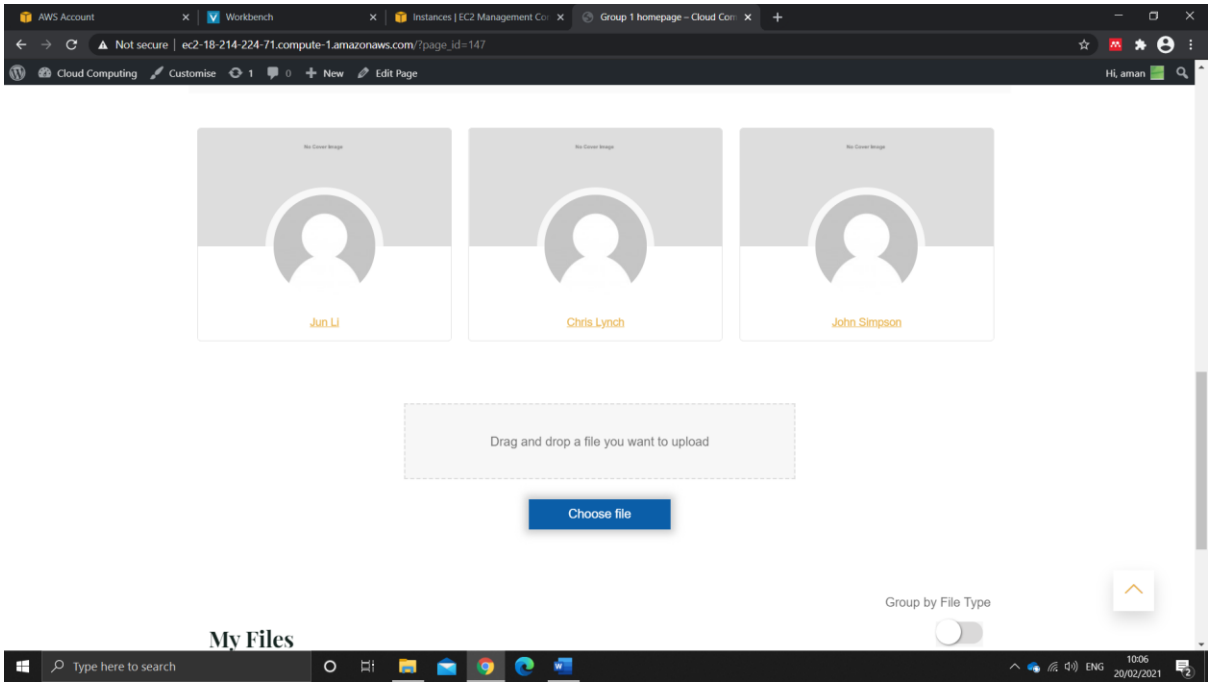


Figure 12: Group Members and File Sharing

## 15. WordPress and Drupal Comparison

WordPress and Drupal are two of the most well-known CMS currently used in the industry, both have their pros and cons.

Drupal has been around longer than WordPress, Drupal was launched in the year 2000 and WordPress was launched in 2003. However, WordPress has a giant share of the website market, over 40% of all websites are currently built using WordPress whereas Drupal only has 2.3% of the market (*WordPress vs Drupal - Which One Is Better in 2021? (Pros and Cons)*, n.d.). Furthermore, in the content management market WordPress is also the market leader with nearly 60% of the total market share compared to 2.3% of the market shared for Drupal. Figure 13 and 14 provide this breakdown with all the well-known CMS.

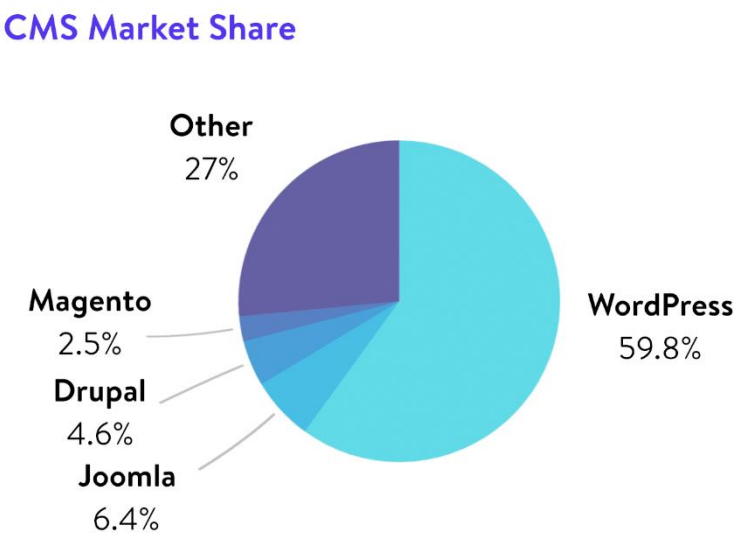


Figure 13: CMS market share

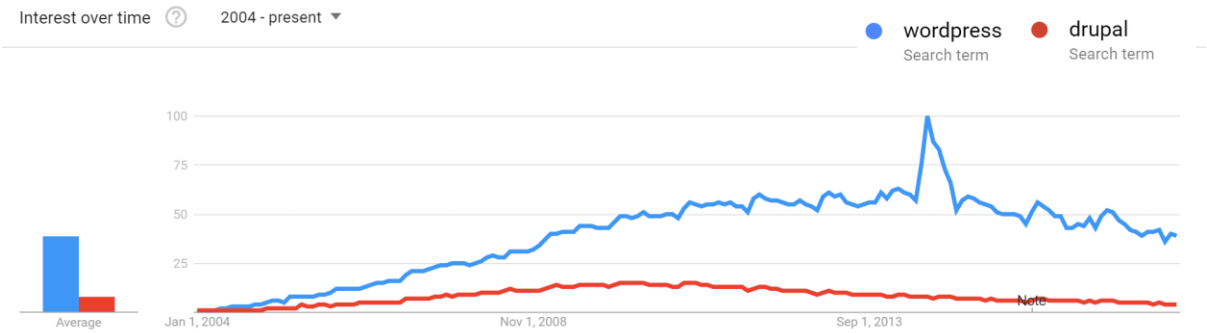


Figure 14: WordPress and Drupal popularity

One of the reasons for WordPress' popularity is it's ease of use compared to Drupal. Drupal is geared towards developers whereas WordPress has a very short learning curve and can be picked up by non-developers just as easily (*WordPress vs Drupal - Which One Is Better in 2021? (Pros and Cons)*, n.d.). Furthermore, it is easier to get help when using WordPress as when compared to Drupal, although when using Drupal you can get help via various volunteers however, WordPress provides help directly from the developers of WordPress.

WordPress is easily extendible when compared to Drupal and provides many more plugins and themes. WordPress currently has over 53000 plugins and over 5000 themes whereas Drupal currently has around 39000 plugins and around 2500 themes (*WordPress vs Drupal - Which One Is Better in 2021? (Pros and Cons)*, n.d.).

## 16. Conclusion

The purpose of this report was to provide a breakdown of the design and workings of a website. It provides the functional and non-functional requirements alongside a project and test plan.

Furthermore, the design methodology of the website is discussed and the working screenshots. In conclusion, the website meets all the requirements of this project alongside some extra functionalities such as being able send messages to other users, being able to search the users within the group and so on.

## 17. Bibliography

*WordPress vs Drupal - Which One is Better in 2021? (Pros and Cons)*. (n.d.). Retrieved February 20, 2021, from https://kinsta.com/blog/wordpress-vs-drupal/