Digital Lab Marking System

Heriot-Watt University

Final Year Dissertation

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November 20, 2016

Declaration

I, Lewis Francis McNeill, confirm that this work submitted for assessment is my own and is expressed in my own words. Any references, made within it, of the works of other authors in any way (e.g., ideas, equations, figures, text, tables, programs) are properly acknowledged at any point of their use. A list of the references employed is included.

Signed: Lewis McNeill

Date: November 20, 2016

Abstract

The aim of this dissertation project is to replace the current system for the marking of computer labs with a new digital system. This will enable lecturers to create a marking scheme online. Lab helpers will select the student they are marking and the marking scheme will then be loaded, marks will be entered and then made immediately available for both student and lecturers to view. It will also provide useful statistics for both student and lecturers.

Contents

1 Aims, Objectives and Project Description

1.1 Aim

The aim of this dissertation is to design and implement a system for the digital marking and analysis of computer labs and to help improve the speed at which they are marked. The system will also provide useful statistics for both lecturers and students.

1.2 Objectives

- Simplify the way that labs marks are currently processed.
- Allow lecturers to create marking schemes online that lab helps can access
- Lab helpers can mark students in labs using marking schemes.
- Develop a system that allows lab helpers to mark labs using an online application.
- Allow students to see the mark they got from the lab instantly.
- Provide useful statistics and graphs for lecturers.

2 Literature Review

This section contains the current academic literature relating to anything relevant to the creations of a digital marking system.

2.1 Marking Systems

Current marking systems rely on lecturers marking and returning results quickly to allow for student improvement. As the number of students increases on courses the amount of time required to mark assignments naturally takes longer and in some cases can actually be scrapped completely [2]. To cope with increasing class sizes courses are beginning to move towards peer marking.

2.2 Digital Marking Systems

Digital marking systems are designed to mirror current paper based marking systems but take advantage of the electronic environment "Effective electronic marking for on-line assessment".

2.3 User Dependant Views

2.4 Custom Website Forms

Survey monkey [3] is an example of custom web forms being created by users. Founded by Ryan Finley in 1999 Survey Monkey enables users to create there own surveys and easily distribute them. It builds the surveys by letting the user select the contence of the question and what the response type will be: The user can also decided if the response are completely anonymous by default the participants ip address is stored when they complete the survey. The user can continue to add as many questions as they would like, even after the survey is initially created. They then choose how they would like to have their survey distributed; they can select from a web link, socialmedia, email or enbed on website .

As participants complete the survey the results are immedatly stored The results of the survey are visible to the user by login into their account on surveymonkey. They can choose to look at

the responses indavidually or look at metrics about how participants responded.

The patent "Customizing Forms In Electronic Mail Systems" [4]

2.5 D3

[1]

3 Requirements

3.1 Functional

Requirements for the system are each given an idea depending on the type of requirement: FR for functional requirements, NFR for non-functional requirement and SR for system requirements. Along with this, each requirement has a description stating what the requirement is and a priority. The priority value can be low, medium or high, which shows which requirements will be implemented first into the system.

3.1.1 User Requirements

Functional requirements also include an access column which defines what users should be able to use. Some items are restricted to lecturers as some requirements should only be be usable by lecturers and lab-helpers and not by students.
The access levels are: 1-Admin, 2-Lecturers, 3-Lab Helpers and 4-Students

Table 1: Functional User Requirements

ID	**Requirement**	**Priority**
FR1	Test	Test
FR2	Test	Test

3.1.2 System Requirements

ID	**Requirement**	**Priority**
SR1	Test	Test
SR2	Test	Test

3.2 Non-Functional Requirements

ID	Requirement	Priority
NFR1	All personal data should be encrypted	High
NFR2	Stats Should be updated as lab marks submit grades	High
NFR3	Stats Calculations should take less than 2 seconds	High
NFR4	Loading Student Marks should take less than 2 seconds	Low
NFR5	All php should use prepared statements	High
NFR6	System must function on a wide variety of smartphones and tablets	High
NFR7	The system must be able to handle a large number of users without any faults	Medium
NFR8	Password must contain alphanumerics and have a minimum and maximum length	Medium
NFR9	Test	Test

4 Strategy for testing and evaluation

4.1 Testing

During each sprint unit tests will be created and run on modules of code to make sure that they function correctly and to check that the system is ready for the next module to be developed.
Each sprint will have sprint set requirements that are to be developed by the end of the sprint. Each requirement will have a testable case that will be run at the end of the sprint to make sure that it is successfully implemented.

4.2 Evaluating

To evaluate properly how successful I have been at creating a new Lab Marking System I will conduct a usability case study. Lecturers, lab helpers and students will be asked to use the systems and provide feedback, to help evaluate the system and discover what improvements can be made.
To evaluate how effective the code is I will create test cases. These will test how efficient the code is at running functions and help find areas for future improvement in the system.

5 Project Plan and P.L.E.S Issues

5.1 Project Plan

The Gantt chart for this dissertation can be seen in figure(1). It is broken down into 5 sections: Design, Development, Evaluation, Dissertation and Poster.

Design Stage Starts at the end of semester 1 to allow myself time to complete other course work. In this stage I will create mock-ups for the user interface, a database schema and define what will be occurring in each of my sprints in the next stage.

Development Stage: Starts once the holidays are over. It consists of three two week sprints with a week's break in between to allow for evaluation, write ups and other coursework. When the three sprint finishes I will go straight into the evaluation stage.

Evaluation Stage: During the final two weeks before the draft handin, I will conduct a usability case study and write up the remainder of my dissertation for the draft handin.

Final Deliverable Stage: This stage for me is the time to focus on feedback from the draft hand-in and make sure my Dissertation is of a high enough standard.

Poster Stage: This stage will be entirely dedicated to the design and creation of my dissertation poster.

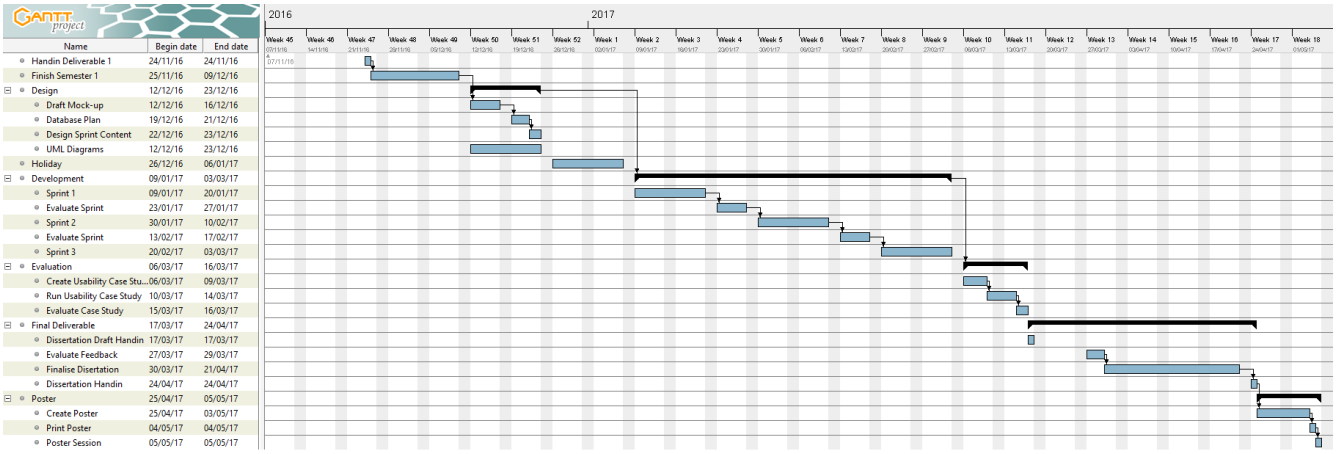

Figure 1: Project Gantt Chart

5.2 Risk Analysis

The risks relating to this dissertation are shown in table(2) each risk has an associated Likelihood, Impact and a Mitigation Strategy. Likelihood and Impact values can be low, medium or high.

Table 2: Risk Analysis

ID	**Risk**	**Likelihood**	**Impact**	**Mitigation Strategy**
R1	Superviser Leaves	Low	Medium	Inform alisdair and request a new supervisor
R2	Software Licenses Expire	Low	Low	Check licenses for all software i will be using during the project to make sure they are valid for length of project
R3	Loss of data	Low	High	Back-ups will be stored throughout the project
R4	Lecturers cant create custom marking schemes	Medium	High	
R5	Requirements changed	Medium	Medium	Evaluate requirements before starting development phase and evaluate requirements regularly during project to notice any required changes before it causes a major issue
R6	System speed is slow	Medium	Medium	
R7	Users cannot understand the system	Medium	Medium	
R8	Browsers compatibility	High	High	
R9	Personal Injury	Low	High	Development would have to be delayed and discussions made with supervisor about how to continue
R10	Test	Test	Test	test
R11	Test	Test	Test	test

5.3 Professional Issues

The professional part of this project will be done by following coding standards for the languages that I decide to use.

As this project will be a web application I will ensure that both the html and css are validated.

The system will be made open source to allow other people to look at and improve the system once I have completed it.

The project will be provided with a user and developer documentation allow for easy development and implementation of the system.

5.4 Legal Issues

There are multiple legal issues relating to this project. The most important one is the Data Protection Act. Since the systems will be designed to store data about students I will have to make sure that all data is encrypted and securely stored.

I will make sure that any software included in the development of the system is open source and that I am meeting all the terms of service to use it.

5.5 Ethical Issues

A major ethical requirement of this project is to do with the storage of students personal information on a digital system; to deal with this issue I should consult the data protection act.

Another issue that is raised by this project is making sure that students are not deceived and that the marks they see are actually the ones they have received.

5.6 Social Issues

A few social issues are raised by this project. Such as if students can see the mark they have received straight away, will lab helpers feel pressurised into giving higher grades.

Will this system result in a reduction of lab helpers being required to mark labs? If the system

speeds up the time to mark students work, less lab helpers may be required to run labs, resulting in people looking for work.

References

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