MSc Applied Computer Science

Postgraduate Diploma Project Brief

Part II – Application Implementation & Testing

(Module FDM06)

Revision: September 2020

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1. Purpose and Scope

The work described in this document is intended for use by students on the second year of the FDM MSc Applied Computer Science Programme who are studying at Postgraduate Diploma level and who have completed Part I of the associated project. The demands of this project are expected to provide the necessary opportunities for students to fulfil Learning Goals FDM05 and FDM06 of the Programme.

2. Relationship to Learning Goals FDM05 & FDM06

This project is split into two distinct parts, each intended to allow the student to achieve the learning objectives set out in FDM05 and FDM06, respectively. Part I essentially deals with Application Design Process and issues of critical assessment of Application Designs. Part II deals with implementation and testing of applications, taking into account Design Goals which have been set out in Part I. Instructions provided in this document are sufficient to complete Part II of the Project and correspond to the requirements of Learning Goal FDM06 only.

3. Instructions

These instructions give direction for how to continue your project through to completion. They are likely to be supplemented by further instructions and support by email, as and when the need arises. It is very important that you contact the MSc coordinator if you have any questions, so that instructions can be clarified and issues arising resolved. Continue to keep the journal of your activities that you should have already started, detailing challenges and learning points as you progress through this project. It will help you to log your progress and to remember key points when you come to reflect on your work at the end of the project.

Project Tasks

1. From your two Technical Design Options, select ONE design that, from your reasoned analysis, best meets your three Design Goals. Give clear reasons why you have reached your conclusions, referring to your Design Goals and the findings of the Critical Design Assessment from your work in Part I.
   Email your Statement of Design Selection and Rationale to your MSc Programme Co-ordinator.

   For guidance: Written evidence for this task should only require 1 – 2 pages of text plus any diagrams.

Minimum Resources:	2x Technical Design Options, Design Goals
Required Deliverables:	Statement of Design Selection and Rationale

2. Design a suitable scheme of Performance Tests to assess the efficiency of performance-sensitive areas within your preferred design, providing reasoned references for any performance indicators and bechmarks chosen.
   Email your Performance Assessment Scheme to your MSc Programme Co-ordinator.

Minimum Resources:	Project Requirements in Project Description (Part I), Selected Technical Design Option
Required Deliverables:	Performance Assessment Scheme

3. Implement your selected design from step (1) in code using your preferred language and associated technologies (e.g. Java or C#/.NET). **Deliver your application in full to your MSc Programme Co-ordinator using an approved FDM delivery method** (e.g. email, document sharing)

   You must provide full Technical Documentation to a professional standard. You may wish to re-use some or all of your design documentation from earlier steps to reduce the required workload here. **Important:** see the Testing section for requirements to write tests before coding. Be sure to keep evidence of your testing activities as you code.

Minimum Resources:	Selected Technical Design Option, Functional Test Plan, Project Requirements in Project Description (Part I)
Required Deliverables:	Application Code Package, Technical Documentation TDD Test Results

4. Test your completed application using your Test Plan and document your results accordingly. Critically assess your implementation in the light of your test results. Comment on the effectiveness of your design strategies, referring to your Design Goals.
   Email your Critical Assessment to your MSc Programme Co-ordinator.

Minimum Resources:	Test Plan, Design Goals, Project Requirements in Project Description (Part I)
Required Deliverables:	Application Test Results

5. Arrange with your MSc Programme Co-ordinator a date to demonstrate your work and attend an oral examination.
   Email your prepared presentation materials to your MSc Programme Co-ordinator. You may do this after your presentation delivery if you wish.

   This is your opportunity to demonstrate your work and answer questions which can support your efforts for a good final grade. Prepare for this event and use whatever resources you need, e.g. a structured demonstration of your application to prove performance, a PowerPoint presentation to illustrate and highlight important points.

Minimum Resources:	Your completed application, A prepared presentation
Required Deliverables:	Presentation materials (eg PowerPoint slide deck, handouts)

6. Project Reflection

You are required to provide a written account that reflects on your experience of the project since it began. This should take the form of an essay or a report (non-technical), separate from your project documentation and should be expressed in around 1500 words (max 2000 words). This should demonstrate your thought processes, challenges you encountered, how you overcame them and what you learned along the way, especially related to the objectives laid out in Learning Goals FDM05-06. Your reflective essay should document your experience of planning and building your project, with regards to the Learning Objectives. It should be less about technical hurdles and solutions and more about your learning process and your personal journey. Refer to the FDM05-06 objectives as you think about the answers to these questions. Questions you may wish to consider addressing might be:

- How well did you manage the project?
- What went well?
- What was hard? Why?
- How did you overcome the challenge(s)?
- What did you learn in the process?
- How and with what rationale did you make important decisions along the way?
- How might this project change the way you view the application design process in the future?

Advice: Keep a journal of your design journey and associated experiences. This will help when gathering thoughts and memories at the end of your project.

Additionally, you should address any learning elements of your project, perhaps referring to important design decisions – how your FDM initial training, subsequent research through the MSc Programme and your experience influenced your final decisions from the perspective of:

- architectural or development process issues you encountered (and, very importantly, how you overcame or exploited them)
- software application performance issues
- how you selected your criteria for comparing issues of design elegance and efficiency
- project management issues

The emphasis in your writing should be on your **learning and development process**.

Minimum Resources:	A journal of your experiences
Required Deliverables:	A reflective essay/report

4. Completion and Delivery Plan

Part II of the project has been designed to meet all the Learning Objectives specified in FDM06. The submission of work will be phased and has been scheduled according to the following plan:

Deliverable(s)	**No of weeks**	
Project instructions issued to student		
Statement of Design Selection and Rationale	1	
Performance Assessment Scheme	1-2	
Implementation Milestone Report 1	4	13
Implementation Milestone Report 2	4	
Fully documented implementation	5	
Critical Implementation Assessment	4	
Project Reflection	1	

It is essential that students keep to the delivery schedule so that sufficient time is available for them to complete their MSc dissertation work within the University allowed period of three years from date of registration.

5. Testing

The Test Driven Development methodology should be followed during the implementation of the project. The preferred way to implement TDD is to automate the code-compile-test process using the relevant tools. Unit testing is the primary test that should be run on the application. It is required to provide test cases before writing any code. Test cases should be comprehensive enough to test every failure scenario. A full application test should take place after every code alteration.

Together with these test tools, a code coverage tool shall be used to calculate the percentage of code accessed by the tests. Only eighty percent or more code coverage will be acceptable. There are a variety of tools to be used. Choose the most suitable tool.

6. Suggested Development Toolset

It is expected that the student will use the development technology they are most familiar with, remembering that the main goal of FDM05 is to:

"To develop a deep understanding of a specific programming language (eg Java or C#.NET) and to be able to utilise a range of applications, libraries and tools to efficiently design and develop high quality applications."

Irrespective of the specific development language chosen, the following tools will probably be required:

- A web server (eg. Tomcat, Cassini or IIS)
- A software development environment (eg. Eclipse or Visual Studio)
- A unit testing framework (eg JUnit or NUnit)
- A UML CASE tool (eg Visual Paradigm for UML)

It is advisable to previously install these tools and check their interoperability before commencing development work, if you do not already have them to hand.

7. Assessment Scheme for FDM06

Your response to this project assignment will be assessed against the criteria set out in the table below.

Learning Goal: To analyse the technical implications of a business oriented functional specification and to create, implement and test a high quality application design, demonstrating the practical application of a specific programming language (eg Java or C#.NET) to a business requirement.

Objective No	Learning objective	Tasks	Indicative deliverable(s)	Assessment criteria
FDM06a	Be able to analyse a complex functional business oriented requirements specification and hence be able to select a solution approach and create an elegant and effective design to fully meet that specification.	- Select Preferred Design - Code Selected Design	- Selection Rationale - Technical Documentation	- Design must utilise appropriate design patterns / strategies - Best practices utilised - Professional presentation
FDM06b	Show a detailed knowledge and deep understanding of the practical application of programmatic commands and constructs through the implementation of a complex business requirement.	- Design Performance Assessment Tests - Code Planned Tests - Code Selected Design - Test Application (Unit/Integration Tests) - Performance Assessment of Implementation	- Performance Assessment Scheme - TDD Test Code - Implementation Package (Code) - Application Test Results - Critical Assessment of Implementation	- Effective use of commands and constructs - Elegance and efficiency evident - Professional presentation - Accuracy proven through tests.