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Bachelor of Science in Computer Science

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Department of Computer Science
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June 2020

Certificate

We accept the work contained in the report titled "TITLE OF THE REPORT", written by Mr. AUTHOR1 NAME AND Mr. AUTHOR2 NAME as a confirmation to the required standard for the partial fulfillment of the degree of Bachelor of Science in Computer Science.

Approved by . . . :

Supervisor: Name of the Supervisor (Title)

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Project Coordinator: Name of the Project Coordinator (Title)

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Head of the Department: Name of the HOD (Title)

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September 31st, 2015

Abstract

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AUTHOR NAME
Islamabad, Pakistan

September 2015

"We think someone else, someone smarter than us,
someone more capable, someone with more resources will solve that problem.
But there isn't anyone else."

Regina Dugan

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Acronyms and Abbreviations

DSA	Data Structure and Algorithms
OOP	Object Oriented Programming
PF	Programming Fundamentals
SE	Software Engineering
SQL	Structured Query Language
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICODE	Unique, Universal, and Uniform Character enCoding
XML	Extensible Markup Language

Chapter 1

Introduction

1.1 Is computer science science?

Is computer science, science? Yes, it is [1].

This is one of the most important chapters of the report. It should begin with a clear statement of what the project is about so that the nature and scope of the project can be understood by any reader. It should summarise everything you set out to achieve, provide a clear summary of the project's background, relevance and main contributions. The introduction should set the context for the project and should provide the reader with a summary of the key things to look out for in the remainder of the report. When detailing the contributions it is helpful to provide pointers to the section(s) of the report that provide the relevant technical details. The introduction itself should be largely non-technical. It is useful to state the main objectives of the project as part of the introduction. Should have the following headings:

- Project Background/Overview
- Problem Description
- Project Objectives
- Project Scope

1.2 The Degree Project Report

The project report is an extremely important aspect of the degree project. It should be properly structured and contain all the necessary and appropriate information regarding the project.

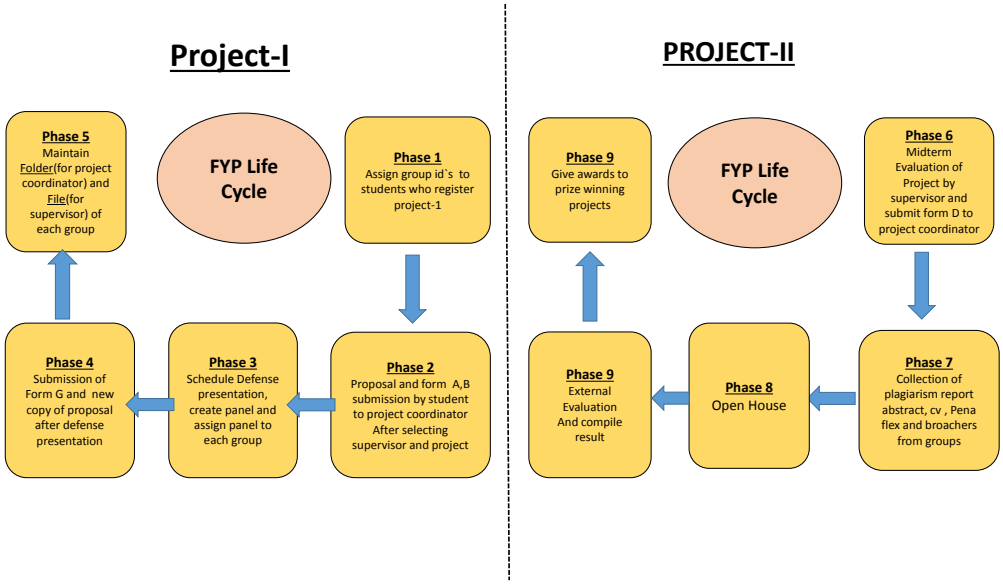

Figure 1.1: Final Year Project Lifecycle

Project report has to be progressively developed as and when various stages of project are completed and last few weeks should be used to bring it together as a coherent document.

A well structured and consistently formatted project report makes reading easier and is suggestive of a careful and professional attitude towards its preparation.

Remember that quantity does not automatically guarantee quality. A 150 page report is not twice as good as a 75-page one, nor a 10,000 line implementation twice as good as a 5,000 line one. Conciseness, clarity and elegance are invaluable qualities in report writing, just as they are in programming, and will be rewarded appropriately.

This document provides various guidelines for preparing a well structured project report.

Chapter 2

Literature Review

Literature review is a systematic method of identifying, evaluating and interpreting the work (similar to yours) produced by others. This chapter should set the project into context and give the proposed layout for achieving the project goals. It is an important chapter especially if the project involves significant amount of ground work. Review prior work critically, identify gaps in knowledge/areas of application and build an argument for your own work. When referring to other pieces of work, cite the sources where they are referred to or used, rather than just listing them at the end.

Chapter 3

Requirement Specifications

In this chapter, first describe the existing system, its limitations or drawbacks and then explain how the new or proposed system will overcome these problems. This should then be followed by complete requirements specification for the proposed system. Describe the behavior of the system to be developed and include a set of use cases that describe interactions the users will have with the system. In addition also describe non-functional requirements. Non-functional requirements impose constraints on the design or implementation (such as performance engineering requirements, quality standards, or design constraints). Should have the following headings:

- Existing System
- Proposed System
- Requirement Specifications
- Use Cases

Chapter 4

Design

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. This chapter should have the following sections:

4.1 System Architecture

This section describes the system in narrative form using non-technical terms. It should provide a high-level system architecture diagram showing a subsystem breakout of the system, if applicable. The high-level system architecture or subsystem diagrams should, if applicable, show interfaces to external systems. Supply a high-level context diagram for the system and subsystems, if applicable.

4.2 Design Constraints

This section describes any constraints in the system design (reference any trade-off analyses conducted such, as resource use versus productivity, or conflicts with other systems) and includes any assumptions made during the developing the system design.

4.3 Design Methodology

Summarize the approach that will be used to create and evolve the designs for this system. Cover any processes, conventions, policies, techniques or other issues which will guide design work. This is for deciding whether you will use structured, object-oriented or other specific methodologies. Most people will use some object-oriented technique with UML.

4.4 High Level Design

This section describes in further detail elements discussed in the Architecture. High-level designs are most effective if they attempt to model groups of system elements from a number of different views. Typical viewpoints are:

1. Conceptual or Logical: This view shows the logical functional elements of the system. Each component represents a similar grouping of functionality. For UML, this would be a component diagram or a package diagram.
2. Process: this view is the runtime view of the system. The components are threads or processes or distributed applications. In UML, this would be a process interaction diagram.
3. Physical: this view is for distributed systems. The components are physical processors that have parts of the system running on them. For UML, this would be a deployment diagram.
4. Module: this view is for project management and code organization. The components are typically files or directories. This picture shows how the directory structure of the build and development environment will be designed.
5. Security: this view typically focuses on the components that cooperate to provide security features of the system. It is often a subset of the Conceptual view.

4.5 Low Level Design

This section provides low-level design descriptions that directly support construction of modules. Normally this section would be split into separate documents for different areas of the design. For each component we now need to break it down into its fundamental units or modules. For an OO implementation in Java, our components would become packages. Then the low level design will take each package and break it down into its classes. For smaller systems, you may have a single UML class diagram that each module description refers to.

4.6 Database Design

The section should reveal the final design of all database management system (DBMS) files and the non-DBMS files associated with the system under development. Provide a comprehensive data dictionary showing data element name, type, length, source, validation rules, maintenance (create, read, update, delete capability), data stores, outputs, aliases, and description.

4.7 GUI Design

This section provides the detailed design of the system and subsystem inputs and outputs relative to the user. Depending on the particular nature of the project, it may be appropriate to repeat these sections at both the subsystem and design module levels.

4.8 External Interfaces

External systems are any systems that are not within the scope of the system under development. In this section, describe the electronic interface(s) between this system and each of the other systems and/or subsystem(s), emphasizing the point of view of the system being developed.

Chapter 5

System Implementation

Implementation is the process of moving an idea from concept to reality. The System implementation is a realization of a technical specification or algorithm as a program, software component, or other computer system through programming and deployment.

5.1 System Architecture

Describe the architecture e.g. in terms of: System internal components, Functionality of the components, Communication between the components Tools and Technology Used Development Environment/Languages Used Processing Logic/Algorithms Application Access Security Describe new application access related security measures, e.g. in terms of: Security Zones/Firewalls, Encryption, Authentication, e.g. Account & Password structures and rules, Authorization, e.g. operator rights and roles, authority handling, Auditing / Access Logging, Safe Data Storage Database Security

Describe new DB related security measures, e.g. in terms of: Remote Access, Authentication (Account & Password: structure, rules), Authorization (rights/roles, handling), Anonymous and Group Users, Auditing/Logging (events, data, log handling).

Chapter 6

System Testing and Evaluation

System testing of software or hardware is testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. Be warned that many projects fall down through poor evaluation. Simply building a system and documenting its design and functionality is not enough to gain top marks. It is extremely important that you evaluate what you have done both in absolute terms and in comparison with existing techniques, software, hardware etc. This might involve quantitative evaluation and qualitative evaluation such as expressibility, functionality, ease-of-use etc. At some point you should also evaluate the strengths and weaknesses of what you have done. Avoid statements like "The project has been a complete success and we have solved all the problems associated with ...! It is important to understand that there is no such thing as a perfect project. Even the very best pieces of work have their limitations and you are expected to provide a proper critical appraisal of what you have done. The following are different types of testing that should be considered during System testing:

- Graphical user interface testing
- Usability testing
- Software performance testing
- Compatibility testing
- Exception handling
- Load testing
- Security testing
- Installation testing

For research based projects this chapter should include complete description of evaluation metrics and analysis/discussion of evaluation results.

Chapter 7

Conclusions

The project's conclusions should list the things which have been learnt as a result of the work you have done. For example, "The use of overloading in C++ provides a very elegant mechanism for transparent parallelisation of sequential programs". Avoid tedious personal reflections like "I learned a lot about C++ programming..." It is common to finish the report by listing ways in which the project can be taken further. This might, for example, be a plan for doing the project better if you had a chance to do it again, turning the project deliverables into a more polished end product.

Appendix A

User Manual

Appendices are provided to give supplementary information, which is included in the main text may serve as a distraction and cloud the central theme.

- Appendices should be numbered using alphabets, e.g. Appendix A, Appendix B, etc.
- Tables and References appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.
- Appendices shall carry the title of the work reported and the same title shall be written in the contents page.

References

[1] Peter J. Denning. Is computer science science? *Commun. ACM*, 48(4):27–31, April 2005. Cited on p. 1.