

**Imus Institute  
of Science and Technology**

UNDERGRADUATE THESIS

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**Assessment Software**

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*A thesis submitted in fulfillment of the requirements  
for the degree of BS in Electronics Engineering*

*in the*

*Engineering Department*

June 28, 2021

## Declaration of Authorship

I, John Jeruel TIONGCO, declare that this thesis titled, "Assessment Software" and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed:

Date:



**Imus Institute  
of Science and Technology**

*Abstract*

Engineering Faculty  
Engineering Department

BS in Electronics Engineering

**Assessment Software**

by John Jeruel TIONGCO

The project aims to explore the possibility of modernizing assessment procedures via software developed using industry standards such as AGILE, UP, UML and many others. The paper can treated as a *blue print* and the *alpha version* of the software a *proof of concept*. The paper also contains many software development artifacts such as a *use case model*, *class diagrams*, *interaction diagrams*, and many other models.

This project does not aim to, first, justify the existence of the project by presenting a robust *business case*. Second, produce a software up to its *end of life-cycle*.



## *Acknowledgements*

First, I would like to thank Engr. Berone Bunyi, my advisor, for guiding the project and providing support at every turn.

To Engr. Arnold Balbuena as my mentor and father of the engineering department.

To Engr. Gilbert Laguardia for providing feedback during initial presentation.

To Aleli Benzon for proof reading and providing suggestions to improve readability.



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# List of Abbreviations

**LAH** List Abbreviations Here  
**WSF** What (it) Stands For



*To Aleli, Bambam, Pimpim, and my Family, Thank you...*



# Preface

The Preface is an optional read but contains vital information on how the paper was structured, the resources used in creating the software and writing the paper itself, and finally additional resources such as the online repository of the project.

## Structure of the Paper

Although the paper is labeled as thesis it is virtually a capstone project. This is more evident when the only requirement given is that it should have a prototype. And so the suggested format from the article “Guidelines in Writing Design Project / Research Project Proposal” doesn’t seem to frame the project properly. Be that as it may, in order to comply and frame the project properly, I superimposed the *Universal Process Phases: Inception, Elaboration, Construction, and Transition* over the suggested format in the following manner:

**Chapter I–The Problem and Its Setting *superimposed with Inception*** – Contains the subsections *Vision, Business Case, Supplementary Requirements, Use-case Model, and Iteration Plan* which replaced the subsections *Introduction, Statement of the Problem, Objectives of the Study, Importance of the Study, and Scope and Limitations of the Study* respectively. The lack of the subsections *Definition of Terms* and *Conceptual Framework* is addressed on the next chapter.

**Chapter II–The Problem and Its Setting *superimposed with Elaboration Pt. 1*** – This chapter completely deviates from the suggested format since there are no hypothesis to prove or a conclusion to draw. There are also no conceptual framework on which the project can be framed into. Instead this chapter is spent on creating that *conceptual domain* with the help of a *class diagram* in **UML**.

**Chapter III–Methodology *superimposed with Elaboration Pt.2 and Construction* – description**

In addition the manual of the software can be found in “Cross Ref” appendix

## Software, Standards, and Technology Used

Below is a table enumerating all the software, standards or languages, and other technologies used in the creating the software and the paper itself.

TABLE 1: Resources Used in the Project

Resource	Function	Link
Qt5	UI IDE	some link

## **Repository**

Repo Link

## Chapter 1

# Inception

## Objectives

- Establish the vision, and scope of the software
- Provide the artifacts created during the inception phase such as the Vision, Use Case Model, Business Case, etc...
- Justify why some artifacts have been dropped off
- Create a foundation for the baseline architecture

### 1.1 Vision

**Revision History**

Date	Version	Description	Author
June 20, 2021	Draft	Initial vision for the project.	John Jeruel TIONGCO

#### 1.1.1 Introduction

The purpose of this document is to collect, analyze, and define high-level needs and features of the *Assessment Software*. It focuses on the capabilities needed by the stakeholders, and the target users, and why these needs exist. The details of how the *Assessment Software* fulfills these needs are detailed in the use-case and supplementary specifications.

##### 1.1.1.1 Reference

See Glossary

#### 1.1.2 Positioning

##### 1.1.2.1 Problem Statement

<b>problem of</b>	The lack of modernization in assessment
<b>affects</b>	Test makers and test takers
<b>the impact of which is</b>	That there is too much manual labor that can otherwise be automated through software.
<b>a successful solution would be</b>	Create a software that can automate assessment, reducing time spent and improving the integrity of the results.

### 1.1.2.2 Product Position Statement

<b>For</b>	Individuals or small to medium size organizations.
<b>Who</b>	Wish to automate assessment procedures.
<b>Assessment Software</b>	Is an <i>open-source</i> software product.
<b>That</b>	That can automate assessment such as testing and evaluating.
<b>Unlike</b>	Expensive web-base XaaS solutions which are complicated to use. Or general document editing programs which lacks essential features.
<b>Our Product</b>	Is simple. Doesn't require programming skills to use or extensive hardware resources. Can be used <i>off-line</i> . And intended for personal and small scale uses.

### 1.1.3 Stakeholders and User Descriptions

#### 1.1.3.1 Stake Holder Summary

Name	Represents	Role
Developer	As of now represents the entirety of the project	Main source of funds and does everything in the project, from requirement, analysis and design, implementation, testing, deployment to project management
End-user	Represents individuals who wants to use the software, mainly me	Uses the software

#### 1.1.3.2 User Summary

Name	Description	Stakeholders
Test makers	Creates question banks and generates test Administers test.	Self-represented
Test takers	Takes the test	Self-represented
Evaluators	Evaluates the results and draws conclusions.	Self-represented

#### 1.1.3.3 User Environment

Assessment is a lengthy process and tedious at times. Often the purpose of assessment is missed altogether and *passing the test* becomes the priority. This leads to assessment being reduced to a compulsory *formality* instead of a tool for learning.

Users are expected to have at least a relatively *low-end PC* in order to use the software. Internet connection is not required in the operations but might be needed in updating the software.

#### 1.1.3.4 Key Stakeholder or User Needs

The *needs* provided in these section is generated by myself as I am the first *end-user* of the software. As it moves further in development I might elicit new needs from future stake-holders and end-users.

Need	Priority	Concerns	Current Solution	Proposed Solution
<b>Automatic test creation</b>	High	<b>Manual test creation is tedious and time consuming</b>	No current solution	Employ the use a question bank and automatically generate a test questionnaire
<b>Automatic test checking</b>	High	<b>Software should be able check test answers</b>	No current solution	Answers are of course included with test item so checking the answer can be automated
<b>Digitized test results</b>	Low	<b>Manual recording is time consuming and laborious</b>	No current solution	Test results are converted to a spread sheet readable format like .csv or can be pipe-lined to a <b>DBMS</b> . alternatively an evaluation module can made for the software
<b>User Management</b>	Medium	<b>User should be able to save their details along with their work</b>	No current solution	Simple user class that can be used to save data about the user
<b>Able to run on a low-end PC</b>	Medium	<b>I have a potato laptop</b>	No current solution	Develop for low-end PC
<b>Usability Requirements</b>	Low	—	No current solution	Will be addressed in the <i>UI Mock-ups</i>
<b>Technical support needs</b>	Low	—	No current solution	Will be addressed during deployment stage

#### 1.1.3.5 Alternatives and Competition

The only true open-source program that can be considered a competition for this project is a *computer-based testing* software called **TCEExam**. TCEExam is a platform

type software that must be run using a web-server. I wouldn't deny the fact that TCExam outclasses this project but in my opinion it fulfills a different niche than what Assessment Software is trying to fill.

For alternatives, there are open-source documents editors such as **Libre Office: Writer, Google Docs and Google Forms**, etc .... These software are intended for general use and lack the main features that address the needs of the end users.

#### **1.1.4 Product Overview**

##### **1.1.4.1 Product Perspective**

Assessment Software is planned to be a standalone software although it would use Qt5 GUI API for its *UI* it's back end architecture would be designed from scratch.

##### **1.1.4.2 Assumption and Dependencies**

No dependencies to other systems as of this version.

#### **1.1.5 Product Features**

Will be provided at Chapter [2](#)

#### **1.1.6 Other Product Requirements**

None for this version

## 1.2 Business Case

One of the goals in the inception phase is to determine whether a new system is feasible and worth exploring. “feasible” is straight forward, while “worth exploring” is somewhat vague. To clarify the term, by saying a project is worth exploring is tantamount to saying the project is profitable. By creating a *business case* both those **risk**, as they are termed in the industry, are analyzed and ultimately justified. But as it stands I find that building a *business case* for this project to be redundant.

### 1.2.1 Rationale for Leaving Out Business Case

The rationale for leaving out *business case* is that both questions asked in this section already has answers. Yes, the project is feasible, it has to be, otherwise the project would be canceled<sup>1</sup>. Is the project profitable? The question is invalid since the project is meant to be *open-source*. Now the question is “Is it valid to leave out the building the business case for the project?”. Yes, it is perfectly valid<sup>2</sup>. An artifact’s function is to serve as utility for the project or the development of a program. In this case building a *business case* doesn’t provide any utility and will only consume resources.

In addition *business cases* are a project by themselves. It may contain sections such as *executive summary*, *problem statement*, *analysis of the situation*, *solution options*, *cost-benefit analysis*, etc.... It is best that such studies and analysis are left to those who have expertise in the subject matter<sup>3</sup>. As an engineering student I think such endeavors is out of my field of study.

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<sup>1</sup>The paper is an undergrad course requirement. The student of course has to fund it to complete the course.

<sup>2</sup>biblio craid larman

<sup>3</sup>Say students of business disciplines such as BS Accountancy or BS Business Management

## 1.3 Use Case Model

### Revision History

Date	Version	Description	Author
June 20, 2021	Draft	Casual form for use cases.	John Jeruel TIONGCO

### UC1: Create Test

**Main Success Scenario:** User starts the system. Assume that the user has already entered his details in the system. Assume also that a question bank has been provided by user. The system generates a test as per specification of the user e.g. number of sections, items per sections, type of test for each sections, etc .... The user saves the generated test.

**Alternate Scenario:** The user has not entered his details. The user then goes to *subfunction* Create New User or *subfunction* Change User. No question bank to generate from. The user goes to the *subfunction* Create a Question Bank. Cannot generate test because question bank does not meet the specification the user has given the system. System provides hints in order to proceed with the generation.

### UC2: Take Test

**Main Success Scenario:** User starts the system. Assume that the user has already entered his detail into the system. Assume that a generated test file is available. The system loads up the test file. The user takes the test on the systems UI or other means of output. The test result is saved along with the user details.

**Alternate Scenario:** The user has not entered his details. The user then goes to *subfunction* Create New User or *subfunction* Change User. The user wants to check her work. *Subfunction* Check Test is called.

### UC3: View Scores

**Main Success Scenario:** User starts the system. Assume that the user has already entered his detail in the system. The system retrieves the data requested by the user e.g. test results with the user details of test taker. The systems views the scores in a comprehensive manner e.g. graphs or reports.

**Alternate Scenario:** User wants to collect the data instead of viewing it on the UI of the system or UI for viewing test result is not yet developed since it is lower in priority. *Subfunction* Other Results Output is called.

### UC4: Manage Users

**Main Success Scenario:** Is a collection of subfunction-level cases such as Create New User, Delete User, and Edit User Details.

**Alternate Scenario:** When subfunction other than Create User is called.

## 1.4 Supplementary Requirements

Revision History			
Date	Version	Description	Author
June 20, 2021	Draft	Supplementary requirements during inception phase.	John Jeruel TIONGCO

### 1.4.1 Introduction

#### 1.4.1.1 Purpose

The purpose of this document is to define requirements of the Assessment Software. This Supplementary Specification lists the requirements that are not readily captured in the use cases of the use-case model. The Supplementary Specifications and the use-case model together capture a complete set of requirements on the system.

### 1.4.2 Functionality

Functional requirements are captured via the defined use cases.

### 1.4.3 Usability

**Ease of Use** – Using the software should not require any knowledge in programming. UI should be intuitive and akin to many popular software.

### 1.4.4 Reliability

**Redundancy** – Test results and question banks should have redundancy in case of system failure to prevent loss of critical data.

### 1.4.5 Performance

**Low Resource Requirement** – Software should not consume too much resources. Functionality is prioritized over aesthetics.

### 1.4.6 Supportability

**Availability of Updates** – Updates should be readily available via repository.

### 1.4.7 Design Constraints

Software must be able to run on low end PCs

### 1.4.8 Online User Documentation and Help System Requirements

**Getting Started Document** – At least a “Getting Started” documents should be provided.

**Man Pages** – Man pages style Help for functions while UI is not yet developed.

### 1.4.9 Purchased Components

None as of this version.

**1.4.10 Interface**

No UI plans as of the first iteration.

**1.4.11 Licensing Requirements**

Should be open source. Publicly license may be used.

**1.4.12 Legal Copyright and Other Notices**

None as of this version.

**1.4.13 Applicable Standards**

None as of this version.

## 1.5 Iteration Plan

For now I am the sole developer of the software. I find it absurd to create a schedule for each task. With regards to the timeline it also difficult to provide one with any degree of accuracy. As for milestones below is list of critical ones going into elaboration phase of *iteration 1*.

- Create domain model for the core architecture
- Convert UC1 and UC2 to fully dressed version. To define requirements even further.
- WIP



## Chapter 2

# Elaboration Pt. 1

### Objectives

- Establish what the software should be. Possibly what it will be in the future
- test test

## 2.1 Main Section 1

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### 2.1.1 Subsection 1

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### 2.1.2 Subsection 2

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## 2.2 Main Section 2

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## Chapter 3

# Elaboration Pt.2 and Construction

### 3.1 Main Section 1

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#### 3.1.1 Subsection 1

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#### 3.1.2 Subsection 2

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### 3.2 Main Section 2

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## Appendix A

# Frequently Asked Questions

### A.1 How do I change the colors of links?

The color of links can be changed to your liking using:

```
\hypersetup{urlcolor=red}, or  
\hypersetup{citecolor=green}, or  
\hypersetup{allcolor=blue}.
```

If you want to completely hide the links, you can use:

```
\hypersetup{allcolors=.}, or even better:  
\hypersetup{hidelinks}.
```

If you want to have obvious links in the PDF but not the printed text, use:

```
\hypersetup{colorlinks=false}.
```



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