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W0246905

PROG2700 Polling system

System Design Document

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# Use of this Document

This document is meant as a guide in explaining various aspects of the ‘Prog2007 Polling machine’ system and the DBAS4002 – 2023 Elections database. Please refer to the quick reference table of contents to explore the document and figure there in by pressing the control key and select the section you wish to visit.

This project is being produced in concert with a programming in c language project, and a T-SQL project for educational purposes and therefore is not meant to be used in anyway outside of the scope of the NSCC IT-Programming course. If you have received a copy of this program, or any involved documents, please be advised that the author of any of these items is not liable for any damages incurred from the use of these systems. And reproduction, or distribution of any of these documents requires express condition for the author and must be labelled properly as ‘for educational use only’.

This document will be referring several aspects not included in the document itself by citation to the proper document, or by images of documents of programs. Please see the bibliography at the end of the document for information on the referenced documents. In addition, the systems being used in this document, including that of the ‘IntelliJ CLion’ IDE (integrated development environment), the Microsoft MYSQL Server Management Studio 18, and Microsoft Visio will be added with their website will be linked in the bibliography.

The information in this document will serve to address a few specific areas of interest to the learning outcomes of the SAAD1001 course, including but not limited to SWOT analysis, SDLC project planning, UML diagrams and test cast scenarios for the final product. For more information on any given section, please see the introduction at the beginning of the section. In addition, to view a full list of any acronyms in this document, please see the Glossary.

In addition, please be advised that all UML diagramming in this document is being done with the help of Microsoft Visio under a student license. This project is a creation based on a given set of criteria and any resemblance to any system real world or otherwise is purely coincidental,

# Introduction

## 1.1 Purpose and scope

The information in this document will serve to address a few specific areas of interest to the learning outcomes of the SAAD1001 course, including but not limited to SWOT analysis, SDLC project planning, UML diagrams and test cast scenarios for the final product. For more information on any given section, please see the introduction at the beginning of the section. In addition, to view a full list of any acronyms in this document, please see the Glossary.

The purpose of this document is to present the work plan, and planning and preparation for the creation of various aspects of two other projects. We will explore the strengths and weakness inherit in the system, and well as exploring the work plan and various plans on how the system works and it’s creation.

## 1.2 Project Executive Summary

### 1.2.1 System Overview

This system is broken down into two parts, the PROG2007 Polling Station system, which is the main system for creating an election, and cast votes, and the DBAS4002 – 2023 Election Database. For more information on both these systems, please see the PROG2007 Polling Station User Guide, and Database Design Documentation.

### 1.2.2 Design Constraints

There are a few constraints that need to be mentioned in both systems, this will be an overview, as there in more specific information in the other two pieces of documentation.

1. The PROG2007 Polling station is designed for a smaller election/ for educational purposes. As this is the case it implements a few limitations to keep the system smaller. These include:

* The number of System administrators is limited to one (1) so as to keep the functions of the system limited in scope to a user who can set up the initial settings
* The number of polling officer available in the system is three (3), this is done with the intention that only polling officers who are functioning in a supervisor position can alter information about voters and candidates. This would the be Returning officer, the Poll Supervisor and the Deputy officer
* The number of candidates is limited to five (5), as this is only deal with one position available. Each section of the election should have it’s one polling station, and the assigned position being run for should be label in at the poll. (Later iterations will see a set up for job specific elections)
* The number of voters in the system is limited to 100, if you are running a larger election than this, you will need to consider how to set up a system to track between system restarts.

1. The DBAS4002 – 2023 Election Database has considerably more constraints, so for a full detailed look at that please see the database design documentation.

## 1.3 Document Organization

This document will be focusing on the System analysis and Design including aspects such as SWOT analysis, SDLC Project planning, UML Diagraming for use case, class, and various other aspects and a test case scenario (included from the PROG2007 – User Guide).

## 1.4 Points of Contact

|  |  |  |  |
| --- | --- | --- | --- |
| Role | Name | Email | Telephone(fake number) |
| System Designer | Sophie Dunfield | W0246905@campus.nsccc.ca | (902)-867-5309 |
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| Application Developer | Sophie Dunfield | W0246905@campus.nsccc.ca | (902)-867-5309 |
| Data Manager | Sophie Dunfield | W0246905@campus.nsccc.ca | (902)-867-5309 |

## 1.5 Project References

|  |  |  |  |
| --- | --- | --- | --- |
| Project Name | Software | Version | Comment |
| PROG2007 – Polling Station | CLion IDE | 1.1 | ‘C’ Language terminal voting system used for program. |
| PROG2007 – Polling Station User Guide | Microsoft Word | 1.1 | MS Word document explaining and defining the PROG2007 – Polling station system as seen above |
| DBAS4002 – 2023 Elections Database | Microsoft MYSQL Server Management Studio | 1.1 | Database in SMSS platform used for storing information about the 2023 election |
| DBAS4002 – 2023 Election Database Design Documentation | Microsoft Word | 1.1 | MS Word document explaining and defining the DBAS4002 – 2023 Elections database as seen above. |

## 1.6 Glossary

|  |  |  |  |
| --- | --- | --- | --- |
| Abbreviation | Term | Abbreviation | Term |
| DOB | Date of birth | ID | Identification |
| Admin | Administrator | IT | information technology |
| RO | returning officer | SQL | Structured Query Language |
| DO | Deputy Officer | TSQL | TSQL – Transaction SQL (see SQL) |
| SO | supervising officer | DML | Data Manipulation language |
| UML | Unified Modeling Language | DCL | Data control language |
| SWOT | Strength, Weakness, Opportunity Threat | SSMS | SQL server management studio |
| MS | Microsoft |
| SDLC | Software Development life cycle | SDD | System Design documentation |
| DDD | Database Design Document |
| SAAD | Software Analysis and Design | HRM | Halifax regional Municipality |
|  |  |

# Swot Analysis

## 2.1 Analysis

|  |  |
| --- | --- |
| Strengths | Weakness |
| * Wide range of use * High availability * Open-source software * Compatible with low performance system * Platform independent | * Barebones system * No Gui * Limitations on size * Limited customer support * Financial stability * Low visibility |
| Opportunities | Threats |
| * Easily customisable to any vote/election * Low cost makes it available to smaller groups. * Lots of possibility for iterations and expansion | * Much better systems available on market * Interruption to system maintenance from small staff * Legal action taken against system |

## 2.2 Risk Statement & Mitigation

Much Better systems on market

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Actor/ Threat Community | Intent/ Motivation | Threat Event | Effect | Asset/ Resources | Timing |
| Election software companies | Sell their products over ours | Group is getting software for vote | Loss of business and system stagnation | Free product and small business guilt | Constant threat. Foreclosure imminent |

|  |  |  |  |
| --- | --- | --- | --- |
| Threat Actor | Asset | Effect | Method |
| Public relations | I can post on GitHub, and I might have twitter | People become more aware the product exists and is available | Watch groups looking for suggestions on system. Reach out, don’t sound desperate. |
| Programming | IDE and half a programming certificate | Make the product better | Iterate and continue to follow the SDLC planning guide below |

Legal Action against system

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Actor/ Threat Community | Intent/ Motivation | Threat Event | Effect | Asset/ Resources | Timing |
| Government | Suppression of potentially harmful/illegal voting system | Election system gets used in a capacity that the government see | Lawsuit | I have written for educational purposes multiple time throughout | Mostly election time |

|  |  |  |  |
| --- | --- | --- | --- |
| Threat Actor | Asset | Effect | Method |
| Public relations | Stress the educational purposes, play down the under the table payments | I don’t get sued | Try to avoid getting to the point where we need a lawyer. If we reach that point, we’re finished! |

Small Staff

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Actor/ Threat Community | Intent/ Motivation | Threat Event | Effect | Asset/ Resources | Timing |
| Customer | Need support for system | Multiple elections happening needing IT staff | Loss of faith in the company | I can go to one election a day | Mostly election time |

|  |  |  |  |
| --- | --- | --- | --- |
| Threat Actor | Asset | Effect | Method |
| Public relations | Try to sooth the nerves and make amends with the complaints | Lost of faith in company is lessened, if not mitigate | Puppy dog eyes and cried of ‘small company’ |

# SDLC Project Planning

## 3.1 Introduction to project planning

Because of the size of this project, and the possible quantity of iteration, we are working with the waterfall method of SDLC planning. With such a small team we need to focus strongly on those areas of operation that are critical and make sure they are as stable and complete as we can. Little to no iteration at this point in time, as this is both the beginning of the project, and we need to keep our time frame and workload in hand. This section will break down the major aspects of the planning process and resource allocation for the creation of the System and its database.

## 3.2 Project schedule

It is key to understand that we are under a strict deadline for the 6th of April to complete the System Design in full, Program that V1.0 system, build the database and scripts, write the user guide and the database design documentation, and prepare 4 separate presentations for the share holders (i.e. person giving out marks, hope you’re getting through marking alright, I don’t envy the amount of work you do for us!). Because everything needs to happen somewhat in concert, but some aspect requires information from other aspects to be completed, a loose schedule is made around the most important steps that will free up more possible work.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Month | February | | | | | March | | | | | | | | | | | | | April | | |
| Date | 13 | 17 | 20 | 24 | 28 | 1 | 4 | 7 | 10 | 13 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 2 | 4 | 6 |
| Programming | | | | | | | | | | | | | | | | | | | | | |
| system |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| guide |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| present |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| present |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Database | | | | | | | | | | | | | | | | | | | | | |
| Dml |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Tsql |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Dcl |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Doc |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Present |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| System analysis and Design | | | | | | | | | | | | | | | | | | | | | |
| SDD |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Present |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

As you can see from the above schedule there is a lot of jumping around from piece to piece. As we only have one person on our team that does any work, Sophie will be doing all this and needs to keep on track to ensure that things proceed smoothly. I would like to draw your attention to how this schedule is set up, first the dates being in increments. This is to give a time frame as she is also doing jobs for several other companies at any given time. To begin with, we will work on the system to get a set up and understand how it’s going to work. During this time, we will be working on the System design document to generate our UML diagrams so we can have a steady plan on how the system will function.

After that, we will work with setting up our database so we have a good idea of how the data will be used and where it will be held. After the database scripts have been flesh out, we will use this information to continue with the program and the user guide, revisiting the database as we need to ensure that we have the information as we want it and to clean up the script and make sure everything is function properly.

We will continue the system design at this point, running test cases for both the user guide and the system design document. At this point the SQL scripts should be completed, the system will have been tested and we can put the finishing touches on the three pieces of documentation. The final 1-2 weeks will be used to produce the presentations and review.

## 3.3 Resource Requirements

The resources in this project are something limited, and we will need to be incredibly careful with their distribution. We only have two (2) computers to work on, and Sophie wants to use them both. As the rest of the people on the team are imaginary this should not pose to much issues. In addition, she requires one (1) Hilroy Exercise book for notes on the system and to take notes throughout the project and eighty-nine (89) cups of coffee over the 1.5 months.

## 3.4 Break down of tasks and dependencies

As noted in the proposed schedule, there are a few very important dependencies that we need to account for in working on this project. Listed here are the specific tasks and their dependencies that helped create the schedule.

1. PROG2007 – Polling Station system: Program a polling station with 3 users; voter, polling officer and system admin to simulate an election in which voters cast ballots for candidates added by the polling officer. Only the polling officer can add voters, candidates and declare the results of the election.

* System dependant on initial System design guide.
* Database information crucial to proper format of the systems information.

1. PROG2007 – User Guide: Document and define the system as a guide to anyone who may end up using of working on the system. Include test case, fixes, diagrams as needed. Include all information necessary for a person to understand the workings of the PROG2007 – Polling station system.

* Dependant on completion of the Prog2007 – Polling station system.
* Shares information with system design document.
* Share information with the Database Design document.

1. Polling system presentation: Give a concise presentation to the shareholder to explain the workings and set up of the system and run an example of its function to explain who to use it.

* Prog2007 – Polling station system complete and functional.

1. User Guide presentation: Give a concise presentation to the shareholder to explain the user guide and it’s section. Try to make it interesting so they don’t have to listen to you read through a 15+ page document.

* Prog2007 – User guide completed.

1. TSQL Script: Create a script that can be ran in a database that will create the database, it’s structures and test information.

* System dependant on initial System design guide.

1. DML Script: Create a script to update, alter and/or delete information in the database.

* Requires TSQL Script to be complete and database to exist.

1. DCL Script: Create a script to generate information about the database and select certain information about the candidates.

* Requires TSQL Script to be complete and database to exist.

1. Database design documentation: Write a database design document about the DBAS4002-2023 Elections database, and the corresponding scripts. Included in this should be a conceptual model, and logical model and a physical model, on the database. Conceptual model needs to be made early in the process to get an idea of the structure and process of creating the database.

* Continuing this document requires a conceptual model to exist.
* Shares information with system design document.
* Shares information with the Prog2007 – User Guide

1. Database design Presentation: Present the database and corresponding documentation to share holders for funding in the form of a grade.

* Database design document completed, scripts completed and functional.

1. System Design Documentation: Write document on system, this is the first step despite order and defining how the system will work and how the project is to proceed is crucial to success in getting these projects done in a timely fashion. Revise and track work throughout with the corresponding guides.

* Top priority early in project. Needs to be worked on to simulate the process correctly.
* Requires a knowledge of the system as it’s being created. Work in concert with other projects

1. System design presentation: Present the system analysis to share holders.

* Completion of the System Design Documentation.

## 3.5 Cost estimates

While our costs will be low, we must realize that if Sophie were not an unpaid intern, we would be running into reasonable costs for her work. Even so, the costs versus profits we can expect to see may be dismal. As mentioned before, she requires 89 cups of coffee, which at market cost would be approximately 267$. As this would be inconceivable to pay as a company, we have given her instant coffee to drink. I addition, there was the matter of a Hilroy exercise book, which would cost 0.70$. this blows all the available funding I found in my car seats, but a necessary resource. There is also the cost of rented office space and work on computers to accomplish this task, but once again Sophie has been made to work on this project at home, and to use her own computers. Fortunately, we are nameless entities who need no office space.

## 3.6 Schedule and Cost performance measures

The schedule as determined will be upon Sophie to keep. If she falls behind it will be her job to put in overtime hours to make it possible to complete in proper time. In addition to this, as she is the primary shareholder, and additional costs will rest upon her onus to pay.

## 3.7 Milestones and Reviews

There are primary milestones in which we will review the progress and schedule to ensure we are still on track. This first set of milestones is a 10 minute weekly check in on the schedule and tasks checklist, in doing this we will ensure that the work is being done and we are reaching the goals we set for the previous week.

The secondary milestone and review will happen at march break when we go through the project at length, review what has been accomplished and what still needs to be done and revisit the schedule to ensure we can attain the outcome we want in the time allotted.

The final milestone and review will take place on the week of the 27th where we review all completed material and prepare for the coming presentation to the shareholder.

## 3.8 Acquisition plan

To ensure we have all the necessary materials and processes available to us in the completion of this project we will be collating large amounts of documentations and references. This will serve to ensure that Sophie stays on the right path in the creation of the program, database and relevant scripts and the various documentation. Certain resources have been lent to us by the Nova Scotia Community College, such as a list of requirements to be met, as given by Simranjit Singh, Visio, and Word through a partnership with Microsoft office 365, CLion from IntelliJ and Microsoft MYSQL server management studio.

* All other resources will be provided by Sophie for the accomplishment of the task.
* Special thanks to Simranjit for guidance and teaching that allow this task to be completed.

# UML Diagrams

## 4.1 Use Case Scenario

System

Above you will find the use case diagram. It exists to show the various actions within the system that each user of the system can perform. As you can see, the system admin can set their credentials and login, and they can create polling officers and fix their information.

Polling officers have the most responsibility in the system, as they login and can add voters, and fix their information, add candidates, and declare the results of the election.

Voters can only login in and cast votes, we intentionally limit what they can do because we don’t want them to access or alter the system in any way.

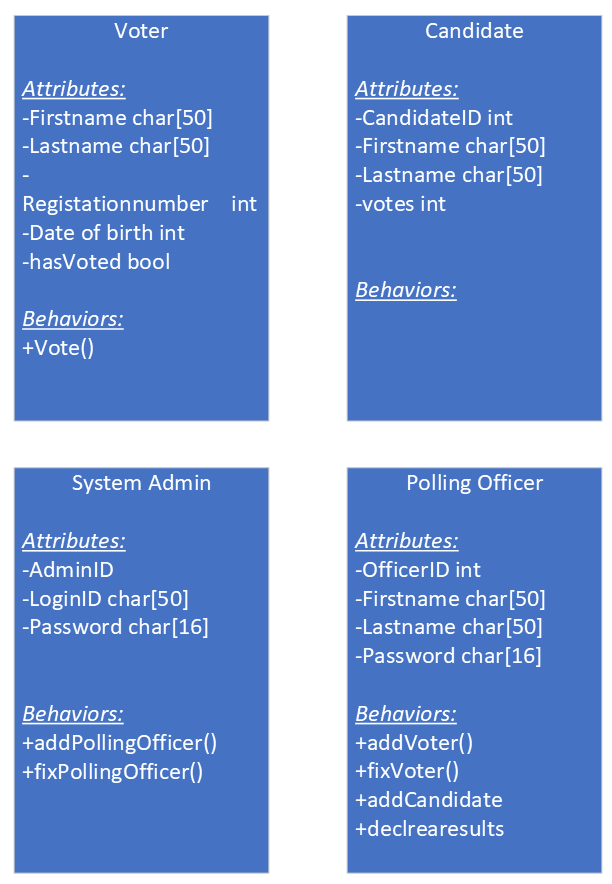
## 4.2 Activity Diagram

Diagram

Description automatically generated

This diagram can be very confusing so I wanted to talk briefly of what the activity diagram is showing. This is kind of an expansion of a use case diagram, I shows how the path works in the system. It starts at the top, and forces the system admin to login to start the use of the system. Next they will have the option of adding a polling officer, this is where the activity diagram starts to differ from use case, it will show the path that each action can take. You can follow these paths and get a general idea of how the system works. You will also find the ‘END’ after the declare results section, and this indicates that the system shutdowns. It is the only exit in the model from the system.

## 4.3 Class Diagram



You will notice that this doesn’t look like a typical class diagram with inheritance and all that nice stuff. Unfortunately, this system has nothing of the sort, and is written in C. This is just to give a good idea of what makes up these structures and the actions they perform.

# Test Case Scenario

## 5.1 System Admin

Step 1: System Administrator starts the program, enters their LoginID and Password.

Text

Description automatically generated(Step 1)

Text

Description automatically generatedStep 2: System Administrator adds polling officer.

(Step 2)

## 5.2 Polling officer Scenario

Step 1: Polling officer signs in.

Text

Description automatically generated(Step 1)

Step 2: Polling officer adds a voter.

Text

Description automatically generated(Step 2)

Step 3: Polling officer adds a candidate.Text

Description automatically generated

(Step 3)

Step 4: Polling officer declares the election results.

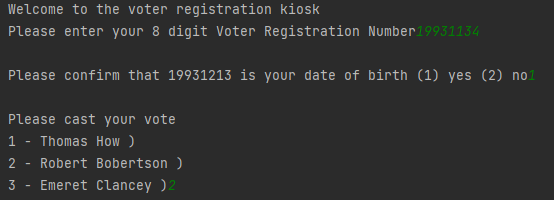
**Text

Description automatically generated**(Step 4)

## 5.3 Voters Scenario

Step 1: Voter login

Step 2: Voter casts ballot

(Step 1)

(Step 2)

# Conclusion

And so, we have reached the end of the system design document. I hope you understand the process which we have followed for the creation of the system and its components. Over all I have managed to follow this document relatively carefully and have managed to produce both documentation and a system that I am very happy with.

For further information on the PROG2007- Polling Station program, please consult the User guide and video there attached. For information concerning the data base, please review the Database design document and video there attached. With this document you will find a video explaining the graphs and general build idea around the document. For any further information please contact Sophie Dunfield as referenced in the points of contact section of this document.

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