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# Introduction

The Software Design Document is a document that provides documentation which will aid in the development of the system by providing details of how the software should be built. Within the software design document are narrative and graphical documentation of the software design for the project including context diagrams, level zero and one diagrams, conceptual diagram, flow diagrams, use case models and other supporting requirement information.

## **1.1. Purpose**

The purpose of this design document is to present a comprehensive architectural overview or technical details of the Arrears Payment Agreement (APA)Tracking system components.

It defines the system architecture, components, classes, their attributes and methods that will implement the requested functionality. It also presents a number of different architectural views to depict different aspects of the system. It is intended to capture the significant architectural decisions which have been made on the system.

The primary intended audience of this document are system designers and system builders. The document intents to provide the development personnel of this project a unified view of the technical details of the system design to be followed during the development of the respective software. The document may need to be updated later to incorporate possible changes during development.

## **1.2 Scope**

The APA Tracking system is a system that effectively monitors and follows up the payment of arrears by the customers of National Water and Sewerage Corporation. The system is to ensure that all arrears are paid according to the Arrears Payment Agreement.

The APA Tracking system is unified for the use of designated Commercial officers and developers of the corporation. I have decided to make the system web-based instead of desktop in order to offer various advantages which include the following;

* It will reduce costs since it won’t require purchase of software for a number of individual desktops and also software to download or install the program.
* The browser-based approach provides greater flexibility which enables the corporation to scale up or down easily and quickly as the business needs change.
* Since web-based systems reside on a single server, any versions or modifications to the system may be installed and made available to all users, unlike for desktop which requires updates to be made to an individual desktop machine in case of updates.

## **1.3 Goals and Objectives**

The goal of this system is to effectively monitor and follow up the customers with arrears and ensures that all arrears are paid according to the agreement. This is to simplify the work of the Commercial officers in as regards to tracking the customers who have failed to comply to the agreement.

Other objectives of this system include;

* To automatically notify the customers when they are due for payment.
* To automatically notify the NWSC Commercial Officers when some customers are due for payment.
* To automatically notify the NWSC Commercial Officers when a customer makes a payment.
* To capture the payment details of the customer in regards to payments made on the arrears.
* To automatically generate monthly reports that show how many arrears have been registered Vs the arrears that have been cleared in a particular month.
* To filter out the defaulting customers and automatically put them on a priority list. This list will contain the details of customers who have failed to comply to the agreement

## **1.4 Abbreviations and Acronyms**

This section provides an understanding of some of the acronyms that are likely to be used in this document plus their meanings and description

|  |  |
| --- | --- |
| ***Term/ Acronym*** | ***Description/ Meaning*** |
| APA | Arrears Payment Agreement |
| Arrears | Debts that are overdue after missing one or more required payments. |
| DESC | Description |
| IEEE | Institution of Electrical and Electronics Engineers |
| REQ | Requirements |
| SDD | Software Design Document |
| UI | User Interface |

## **1.5 References**

* SDD Template for IDA project

## **1.6 Overview**

* Section 1 is the introduction and includes a description of the project, applicable and reference documents. It gives the reader an understanding of the system goals.
* Section 2 provides a system overview. This describes the system characteristics, system architecture, and infrastructure services.
* Section 3 contains the system context. This defines the external interfaces of the system.
* Section 4 describes the system design methods, standards and conventions.
* Section 5 contains the component descriptions. It describes how the different components of the system interact to satisfy the user needs.
* Section 6 includes the Requirements Traceability Matrix which shows the system components that satisfy each of the functional requirements from the SRS document.

# System overview

With the overwhelming number of arrears in the corporation, it is almost impossible to keep track of how and when they are paid. The system has been developed with an aim of monitoring the customers who sign the Arrears Payment Agreement, making sure they pay up as promised.

## **2.1 System characteristics**

The systems user interface will be integrated with a web browser. The client side gathers information from users, investigates some actions of the users, and provides the connection with the server.

The server side system will hold the entire data in a tabular form and must include all functionality to perform operations on this database, receives requests from the clients, evaluate, create and give the user a response to their action.

## **2.2 System Architecture**

The system is a simple client-server system in which web technologies are used to provide forms from the server.

**CONCEPTUAL DIAGRAM**



figure 1: conceptual diagram 1

## **2.3 Infrastructure Services**

The system will have the following added functionalities for its effective use:

* The response time shall be a maximum of 30 seconds, after which the system will be expected to time out. This prevents wastage of network resources and also increases efficiency.
* The system shall allow a maximum of 100 users at a time.
* The system shall ensure a very low consumption of power.
* The system components shall be built to fail independently. These components shall be built so they can handle the failure of other components they depend on (ability to perform failure handling).
* The system shall be integrated with Data Integrity Gateway tools to perform data cleaning to detect, eliminate and correct all errors and inconsistencies.
* The system shall work reliably with automatic backup and recovery features. In case of unexpected termination of a session, the unsaved data shall be recovered without loss and displayed to the respective users.
* The system shall be well documented to enable proper maintenance and in cases of further development and change of team members, they can still follow up.
* The entire system shall be available round the year, except for a periodic maintenance. The maintenance period should be pre-scheduled and short, programmed to be carried out outside the Corporation’s working hours, with early reminders of the unavailable period.

# System context

The user (Commercial Officers) is required to enter the link of the system in the browser of his/her choice and will then be immediately directed to the system’s Login page. The Login page requires a username and password authentication that restricts access to unauthorised users. The Login page also will have a “Forgot Password” option.

On successful login, access to the home page of the system is granted to the user. The home page has all the functionalities of the system.

The system requires http to communicate with the server. The system can be configured to be accessed via any available port.

The web based UI is the only means of communication between the user and the system. The system is accessible through all popular well browsers that interact with JSP and HTML pages.

The functionalities of the system are defined more in the context diagram below;

**THE CONTEXT DIAGRAM OF THE MOBILE APP ANALYSIS SYSTEM**



figure 2: context diagram

LEVEL ZERO DIAGRAM



figure 3: level zero diagram 1

# System Design

As a developer, I used Agile methods as a design approach to designing and development of the system. I chose this approach because the aspects of the project were not well understood at the beginning. Completing the project in iterations helped me to break the problem of the system development into manageable mini-projects and getting all the requirements.

## **4.1 Design methods and standards**

In reference to the conceptual diagram in figure 1, the system is web based. The client side is designed using bootstrap with a number of inbuilt packages like CSS files. It is designed to gather information from users, investigate some actions of the users, and provides the connection with the server. The server side system holds the entire data in a table and must perform all functionalities of the system i.e. receive requests from the clients, evaluate, create and send the required information.

## **4.2 Naming conventions**

This document follows the IEEE format; bold faced font has been used for emphasis, headings and sub headings. Highlighted words are used in the glossary and italicized text is used in the diagram labelling.

## **Software development tools**

These are some of the tools used in the design and development of the system.

|  |  |
| --- | --- |
| **Tool** | **Role played** |
| Microsoft Visio | Drawing the diagrams in the document |
| Microsoft office word | Text documentation |
| Bootstrap | Designing the system interface |
| Web XML |  |
| MySQL |  |
| PHP MyAdmin |  |

## **4.4 Outstanding issues**

There aren’t many outstanding issues to talk about but as earlier stated, I am using the agile development technology so as more aspects arise, they shall be included in the design of the system.

## **4.5 Decomposition description**

The system functionality has been broken down and is represented as a functional decomposition diagram and data flow diagrams.

**FUNCTIONAL DECOMPOSITION DIAGRAM**

figure 4: functional Decomposition diagram

# Component description

**Module 1: Data Analysis**

This module is the core part of the system and will be called frequently and its results will depend on the user commands. The user will choose which parameters to be analysed and how they should be analysed using the graphical interface.

Module inputs:

* User selections/choices

Module outputs:

* Analysis results
* Textual reports

**Module 2: Graphical Representation of results**

The analytical results from module 4 will be presented in a graphical view based on the user selections. A number of graphical features including but not limited to line graphs, bar graphs, pie charts, box plots will be used by this module to display data to the user. The user will select the tool they wish to use to view the results.

Module inputs

* User selections/choices
* Analysis results

Module outputs

* Graphs: Histogram, bar graph, scatter plot.

# Requirements Traceability Matrix

|  |  |  |
| --- | --- | --- |
| **System requirement No** | **Functional requirement** | **Description** |
| **REQ 1** | Display apps and app details | This feature allows the user to view all the apps on the system with all their app details in a table form. The system also has a search button that enables the user to quickly find any particular app they want without scrolling through the whole page. |
| **REQ 2** | Comparing user ratings and app details. | The system compares user ratings and app details. |
| **REQ 3** | Comparing app statistics for different app groups | The system compares app statistics for different app groups |
| **REQ 4** | Comparing different apps in the same group | The system compares different apps in the same group |
| **REQ 5** | Analysing app descriptions | The system analyses the descriptions for the different apps and determines whether they are positive or negative comments. |

# Glossary

***Term/ Acronym Description/ Meaning***

APA Arrears Payment Agreement

Arrears Debts that are overdue after missing one or more required payments.

DESC Description

IEEE Institution of Electrical and Electronics Engineers

REQ Requirements

SDD Software Design Document

UI User Interface