Software Analysis(SA) and Structured Design(SD)

For

Road Repair and Tracking Software

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1.0 Introduction

1.1 Purpose

This SA/SD Document provides a complete description of all the functions and specifications of the Road Repair and Tracking Software (RRTS) developed for automating the road repair management of the Public Works Department of the Municipal Corporation of a large city

The expected users of this software are the clerk at the main office of the Corporation, the supervisors of the respective areas under the corporation, the Administrator of the Corporation and the Mayor of the city.

1.2 Scope

The Road Repair and Tracking System (RRTS) Software is designed to automate the various book keeping associated with the road repairing task of the Public Works Department of the Municipal Corporation of a large city.

1.3 Glossary

Term	***Definition***
RRTS	Road Repair and Tracking Software
DFD	Data Flow Diagram
User/Customer	Customer(s) of the software is(are) the person(s) for whom the software has been designed and those who avail the service provided by the software
Complaint	A mechanism for the Corporation to identify the road whose repair is needed. It's location is given in the registered complaint

1.4 References

SE___Lecture__SASD_ (Provided by Prof. Partha Pratim Das)
IEEE_Std_830_1998___Recommended_Practice_for_SA/SD

1.5 Overview of the Document

The below chapters and their contents are:
Section 2 is the Feasibility study which helps us understand the problem by analyzing the stakeholders and their functions and also their alternatives
Section 3 is Requirements analysis where the various functional and non-functional requirements are elucidated.

Section 4 is the last section where the Global System Architecture is defined and the platform including hardware, software and networking.

2.0 Feasibility Study

2.1 Understanding the Problem

RRTS is intended to automate the book keeping of the entire Road Repair process of a large city. It is used to help various stakeholders in the process realize their responsibility properly and promptly. It helps the customers to easily get their complaints registered and keep track of the status of their complaint. Since everything is automated, there is very less scope for inconsistency and ambiguities.

2.2 Scope of the Problem

- ✓ *Registration of the complaints by the clerk*
- ✓ *Printing fresh area wise complaints every morning by clerk*
- ✓ *Assigning the priority of the repair to be done by the supervisors*
- ✓ *Estimating the resources required for each repair*
- ✓ *Updating the amount of resources done by the City Corporation Administrator*
- ✓ *Checking of the various statistics done by the Mayor*

2.3 Analyzing the Stakeholders

There are a set of registered people in the system.

- ✓ *Clerks working in the various branch offices (mostly the main office)*
- ✓ *Supervisors of various areas*
- ✓ *City Corporation Administrator*
- ✓ *Mayor*
- ✓ *System*

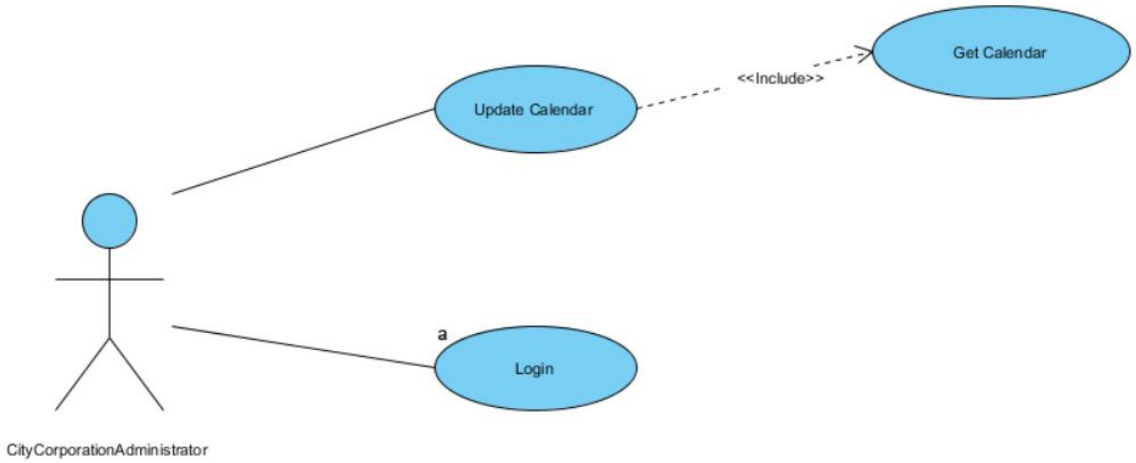
Use Case Diagram of Clerk

Clerk: *The system responds when the clerk enters the complaints/registers the areas. First, the clerk logs in the system using his username and password.*
The dialog box which opens has three options: Register Complaint, Print Complaint and Register Areas. Each option does the thing as its name suggests. Then the complaint/area is stored in the system for future action.

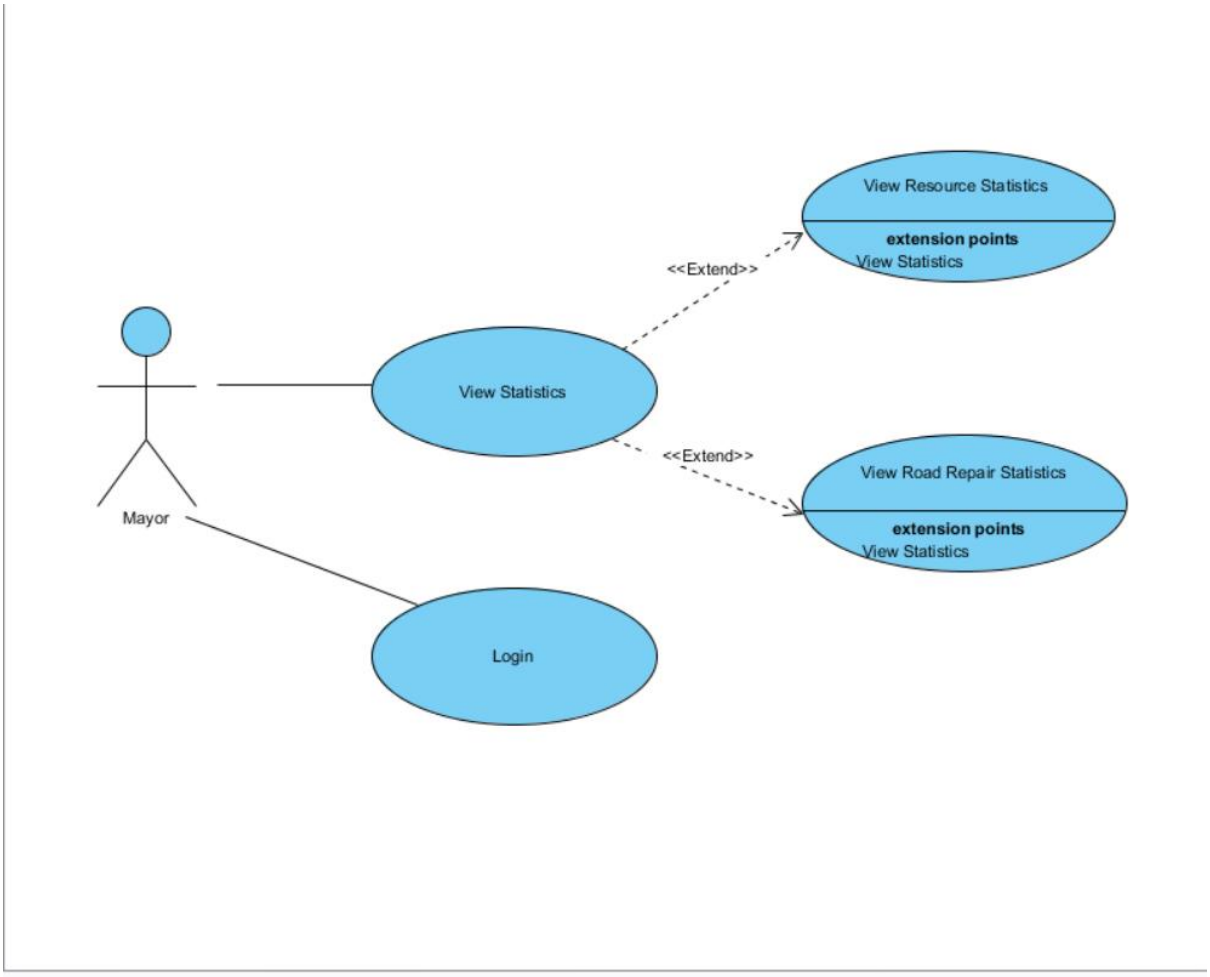
Use Case diagram of Supervisor

Supervisor: *The Supervisor sets the priority of each repair depending on various factors and estimates the amount of resources required for the repair. Every day he is assigned an area and he inspects all the complaints registered in that area and compiles the working schedule.*

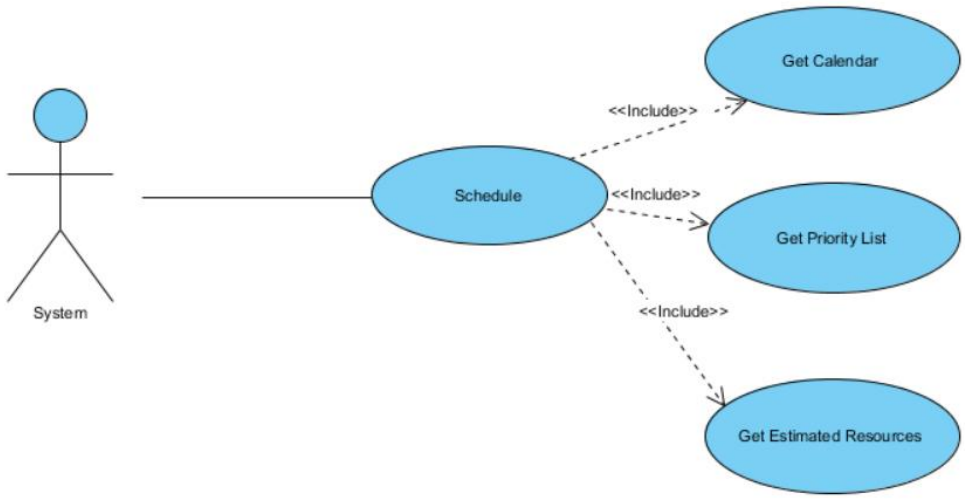
After logging in, the supervisor has several options such as: Get Complaints List, Confirm Complaint,Set Priority, Estimate Resources and Get Schedule. The above options are self-explanatory.



City Corporation Administrator: *The Administrator's function is to update the resources of the system based on their availability. After logging in to the system, he can change the raw materials, Manpower, Machinery according to the situation. The system then updates the schedule of the complaints depending on the new availability*



Mayor: *After logging in, the Mayor can request various road repair statistics and usage of resources like manpower, machinery and raw materials over any period of time.*



System: Schedules based on availabilty of resources,priority list form supervisor.

2.4 Defining Alternatives

The resident can make a complaint personally or by telephone.
The supervisors can use a single system to run the software or use a database to use the software on multiple systems
The software is designed to run on both Linux and Windows Operating Systems.

Instead of using the internal hard drive of the system, we can use an external hard drive to store the database and also keep multiple copies of the data.

The GUI Implementation of the system is the default style provided. It can be customized to suit the user's needs.

The system can be modified to include two layers of security instead of just one present now. The different ways include retina scanning, Barcode Scanning etc.

2.5 Defining Criteria to Evaluate

- ✓ *Cost of Technology*
- ✓ *Cost of Infrastructure*
- ✓ *Lifetime of Technology*
- ✓ *Stability of Technology*

2.6 Assessment of Unusual Circumstances

The data must be taken care of so that it is never lost in any case, be it hardware/software failure, system going down or any unusual circumstance. Care should be taken such that the usernames and passwords of all the different users of the system are never compromised and also can be changed/recovered if they are lost/forgotten

2.7 Report

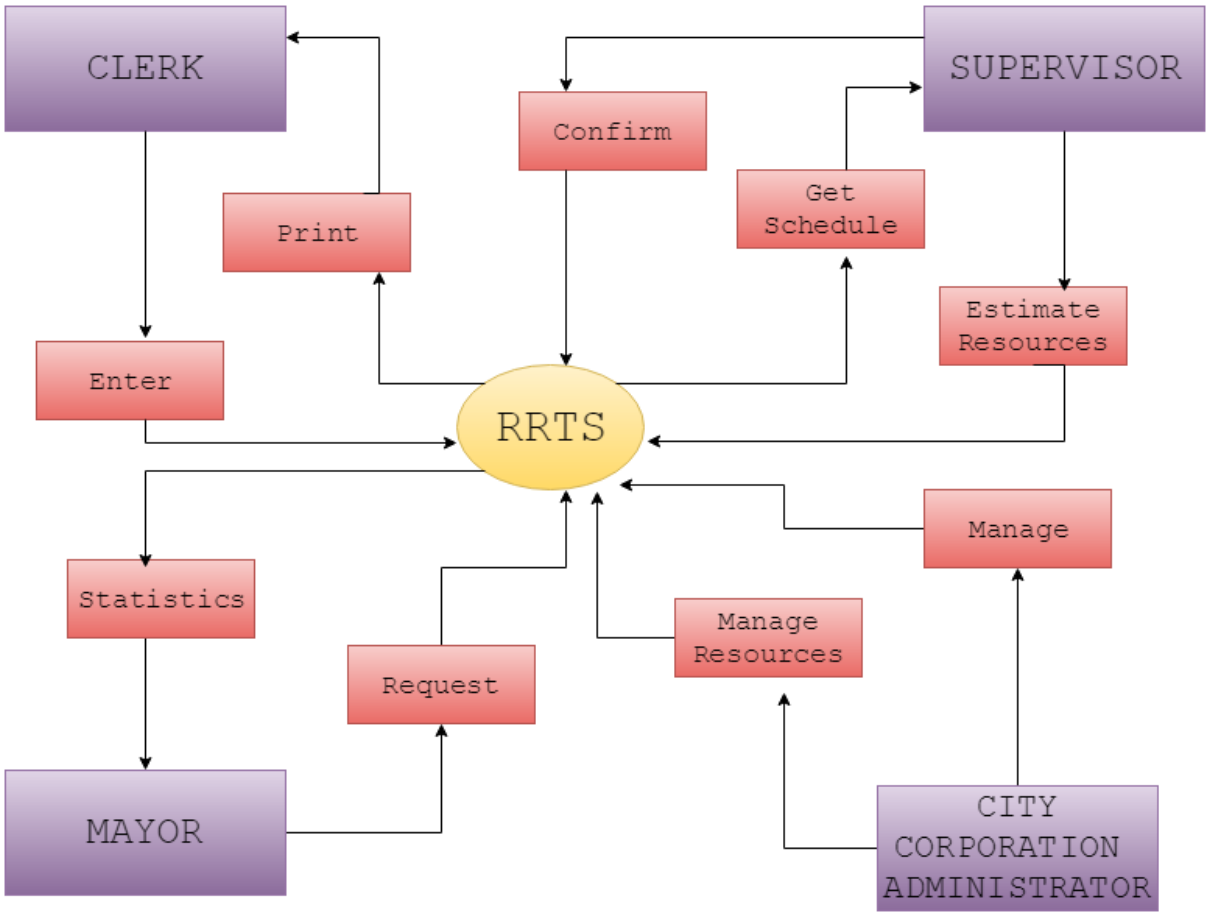
In the present section, we went through the various details of the problem statement.

The objectives and scope have been presented in detail. Then, the roles of different stakeholders were analyzed. The alternatives were developed while noting the cost and lifetime of the parts the alternative brings. The alternatives include software, hardware and security. The primary criteria of evaluation of the alternatives were discussed.

3.0 Requirements Analysis

3.1 Functional Requirements

3.1.1 Data Flow



Context Diagram

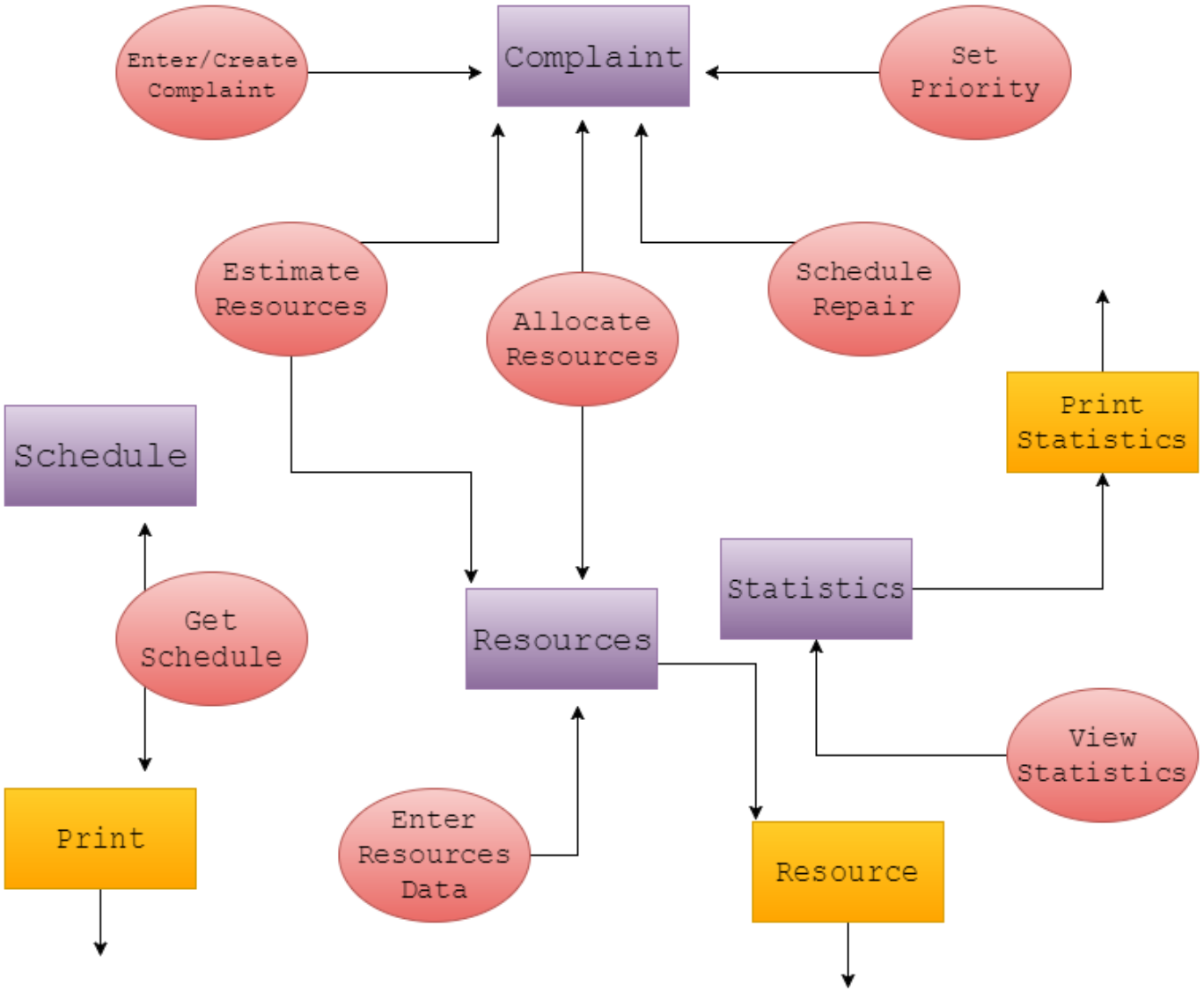
The RRTS is shown as a process with the Clerk, Supervisor, Administrator and Mayor as external entities.

Inputs: *Register Complaint, Estimate Resources, Request Statistics, Manage Resources*

Process: *Road Repair and Tracking Software (RRTS)*

Outputs: *Print Complaints, Get Schedule, Print Statistics*

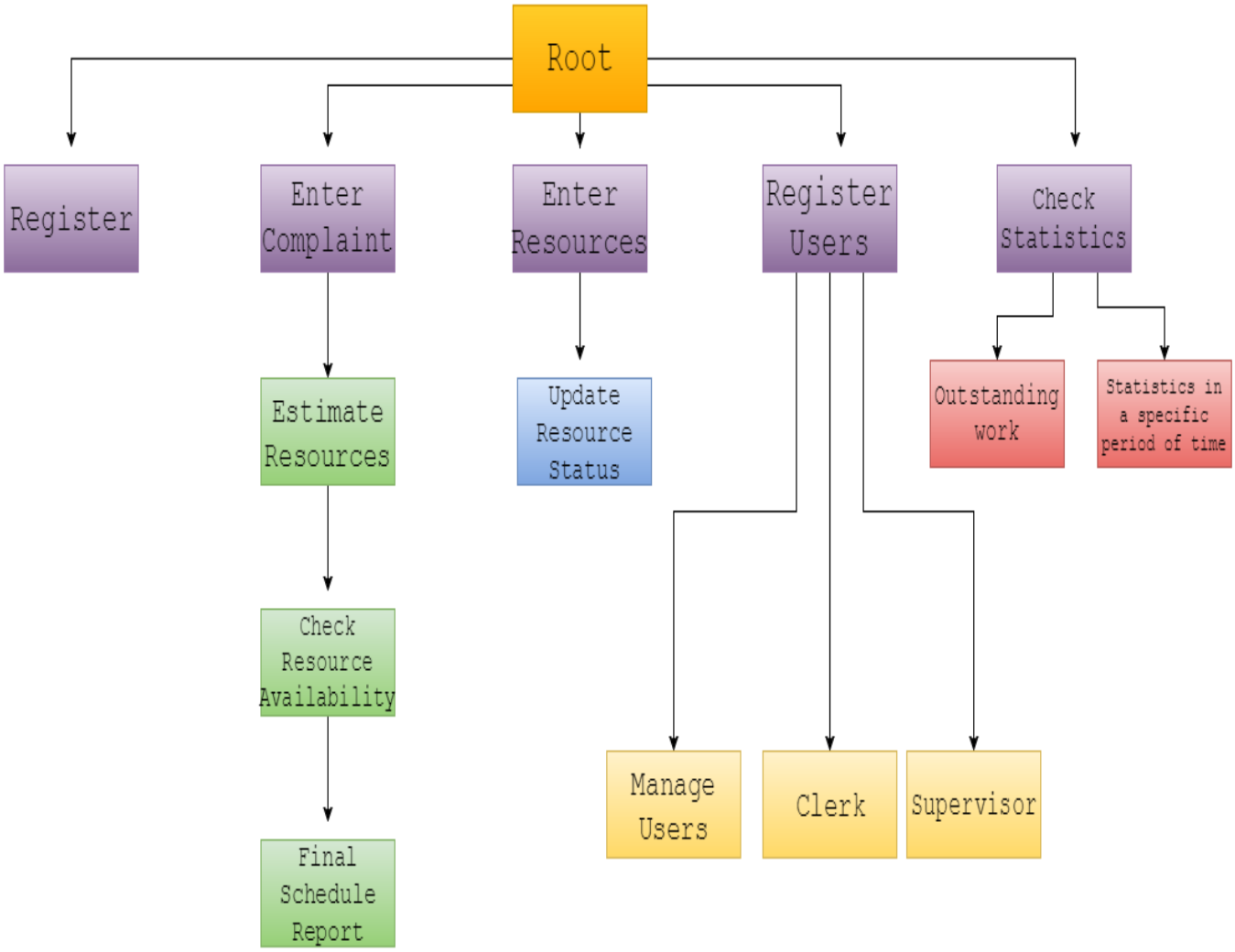
Data Flow Diagram:



Inputs:
Enter/Create Complaint
Enter Resources
Set Priority
Estimate Resources
View Statistics

Outputs:
Print Complaints
Print Statistics
Get Schedule

3.1.3 Structure Chart



3.2 Non-Functional Requirements

Database Requirements: *If the no. of complaints are more, then the size of database will increase proportionally. So, there must be space in hard disk to store the total amount of data which might be more than what was specified in the hardware specifications section.*

Legal Requirements: *RRTS cannot be distributed freely by anyone as it has a software license agreement.*

Availability of RRTS: *RRTS will be available as long as the office of the corporation is open and any of the stakeholders is present.*

3.3 Report

In this section, the functional requirements of RRTS are explained in detail using data flow diagrams and Structure chart. The DFD graphically represents the "flow" of data through the system. The DFD along with Structure Chart help in visualization of data processing of RRTS. The Non-functional requirements are also discussed which ensure an operable and manageable system which functions uninterrupted and in a reliable fashion.

4.0 Detailed Design

4.1 Global System Architecture

The system architecture is a 2-tier architecture which includes the stakeholder at one end and database at the other end. There is no server based middle tier used in the software.

4.2 Platform

Minimum system requirements:

Hardware Requirements:	
Operating system	*Windows 7/XP or later versions, Linux*
Processor	*Pentium III processor or equivalent*
Hard Disk space	*500MB*
RAM	*512 MB*

Recommended system requirements:	
Hardware Requirements:	
Operating system	*Windows 7/XP or later versions, Linux*
Processor	*Pentium IV processor or above*
Hard Disk space	*500MB*
RAM	*1 GB*

4.3 Software Architecture

Object-Oriented architecture is the basis of RRTS. The data representations and their associated operations are encapsulated in an abstract data type or object. Objects interact through functions. The object is responsible for maintaining the integrity of its representation.

4.4 Report

In this section, the global system architecture and the minimum and required hardware and software requirements were mentioned. The software architecture of the software was also discussed.