REGISTRATION AND BILLING SYSTEM

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A report is submitted in partial fulfillment
of the requirements for the award of the degree of
Bachelor of Computer Technology (Software Engineering)

Faculty of Computer System and Software Engineering
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MARCH, 2005

ABSTRACT

Hospital Information System (HIS) is a new term for the system that is used to manage hospital activities. Inside the HIS there got so many modules such as In-Patient Module, Out-Patient Module, Radiology Module and others modules. A study has been done on a few of the existing system, such as Medinous - Hospital Management System, C-DAC's Sushrut - Hospital Information System (HIS) and File-Maker System. Some of the problems from the existing systems are like stand alone system, the system is not in the web-based format, the application has to be installed into every computer in the hospital or office, and others problems. To over come these problems, a Registration and Billing System Prototype have been developed. The format of the system prototype is a web-based application. The purpose of this development is to solve the existing problems found in the existing system. A software development process called Rapid Software Development Life Cycle (RSDLC) has been used to develop this system prototype. The purpose of using this software development process is to shorten the time for the software development process. The tools of the software development are Macromedia Dreamweaver MX 6.0; the JSP web dynamic programming language and Oracle 9i as the system database. The Registration and Billing System Prototype uses an integrated system database to store the patient data. To view the patient data and records, the bubble sort sorting algorithm has been applied. By applying this algorithm into the system prototype, the user of the system can get easily to look for the patient records in a list.

ABSTRAK

Hospital Information System (HIS) merupakan satu jenis sistem yang sering digunakan pengurusan aktiviti hospital. HIS mengandungi banyak modul seperti *In-Patient module, Out-Patient module, Radiology module* dan banyak lagi. Berdasarkan satu kajian yang dijalankan ke atas sistem – sistem yang sedia ada, didapati terdapat banyak variasi sistem HIS. Antaranya ialah *Medinous - Hospital Management System, C-DAC's Sushrut - Hospital Information System (HIS) dan File-Maker System.* Hasil kajian menunjukkan terdapat beberapa masalah dengan sistem yang sedia ada. Antaranya ialah sistem yang digunakan merupakan *"stand alone"*, bukan satu aplikasi web dan tidak diintegrasikan. Bagi mengatasi masalah ini, 2 modul iaitu Pendaftaran dan Pembayaran telah dibangunkan yang berbentuk aplikasi web. Sebagai permulaaan, hanya prototaip sistem telah dibangunkan bagi projek ini. Kaedah pembangunan sistem yang digunakan ialah *Rapid Software Development Life Cycle.* Kaedah ini digunakan kerana kaedah ini tidak memakan masa dan sistem yang dibangunkan boleh diubah suai dengan mudah. Dalam pembangunan sistem ini, beberapa perisian digunakan seperti Macromedia Dreamweaver MX 6.0 untuk membangunkan GUI sistem dan fungsi-fungsi penting manakala Oracle 9*i* digunakan bagi membangunkan pengkalan data bagi sistem. Modul Pendaftaran dan Pembayaran yang telah dibangunkan ini menggunakan pengkalan data yang digabungkan atau lebih dikenali sebagai *"integrated"*. Bagi memaparkan data dan rekod pesakit, satu kaedah penyusunan yang dipanggil *bubble sort* telah digunakan. Ini kerana dengan menggunakan algoritma ini, para pengguna sistem ini dapat melihat data dalam bentuk yang mudah dan senang difahami.

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LIST OF ACRONYMS

ASP	-	Active Server Pages
CASE	-	Computer Aid Software Engineering
C-DAC	-	Centre for Development of Advanced Computing
DBMS	-	Database Management System
HMS	-	Hospital Management System
HTML	-	HyperText Markup Language
IBM	-	International Business Machines Corp.
J2EE	-	Java 2 Platform, Enterprise Edition
JSP	-	JavaServer Pages
OPD	-	Out Patient Department
RAD	-	Rapid Application Development
RSDLC	-	Rapid Software Development Life Cycle
SQL	-	Structure Query Language
SRDD	-	Software Requirement and Design Document
UIA	-	University Islamic Antarabangsa
VB	-	Visual Basic

CHAPTER 1

INTRODUCTION

1.1 Introduction to Hospital Information System (HIS)

Hospital Information System (HIS) is a computerized system designed to meet the information needs of all (or most) of a hospital. This includes many diverse types of data, such as:

a) Patient information
b) Clinical laboratory, radiology, and patient monitoring
c) Patient census and billing
d) Staffing and scheduling
e) Outcomes assessment and quality control
f) Pharmacy ordering, prescription handling, and pharmacopoeia information
g) Decision support
h) Finance and accounting
i) Supplies, inventory, maintenance, and orders management

Hospital Information System (HIS) has evolved as an integration system of order entry systems, an administrative system, and departmental subsystems within a hospital. It has become more and more necessary for every health care staff in a hospital to use a computer terminal at almost every day's works.

Under this circumstances, HIS is expected to provide the staffs with various, world-wide information for decision making and better communication

environment which can be used just on the computer terminals for every day's works. Furthermore, tele-communication between a central hospital and a satellite hospital has become more and more necessary especially when a physician consult with domain experts in other hospitals concerning their patients' care.

Hospital information systems (HIS) solutions provide key information across the continuum of patient care for hospitals, outpatient clinics, and extended care facilities. Patient accounting; patient scheduling and tracking; and electronic medical records that include critical lab, pharmacy, and radiology information are essential elements to a healthcare delivery system that provides quality outcomes. These solutions integrate hospital services with outpatient care, payment services, and public programs. The following partners offer HIS solutions based on Microsoft technology.

1.2 Problem Statement

The Medinous - Hospital Management System and the C-DAC's Sushrut - Hospital Information System (HIS) are the existing system in the current software market. These two (2) systems are using the stand alone Visual Basic (VB) based application and those systems are not connected with the website. Those systems are using the integrated database system to connect with the VB-based application.

The Al-Farabi Clinic (Klinik Bersalin & Klinik Rawatan Masyarakat) which located in Kuantan town is using a Clinic Management System for currently. The system they using now is called File-Maker System which is applied in the Al-Farabi Clinic administrator office. The File-Maker System is a system which is more to the patient registration process and the patient billing process. This system is using the queue-list programming method to make the patient records into the system. This system is using the Lotus as the system platform. It means the File-Maker System can only stored words data type but it

cannot stored image data type and others data type which are out of the words data type. Again, the File-Maker System got the same problem as the Medinous - Hospital Management System and the C-DAC's Sushrut - Hospital Information System (HIS), the File-Maker System is a stand-alone and Lotus-based system.

1.3 Project Objectives

The project objectives are as follow:

a) To develop the prototype of Registration and Billing System
b) To apply the bubble sort algorithm into the system prototype

1.4 Project Scopes

The project scopes are as follow:

a) register In-patient and Pregnant Women into the system
b) generate bill for the In-patient and Pregnant Women
c) use the bubble sort algorithm to sort the patient record in ascending order

1.5 Project Planning

The project planning is show in Gantt chart (refer APPENDIX A).

CHAPTER 2

LITERATURE STUDY

2.1 Development and Future of Hospital Information Systems

Early hospital computer systems developed from business computing systems in the late 1950s and early 1960s, and were used for accounting, billing, inventory and similar business-related functions. Others were developed during the 1960s primarily for storing patient information to be used by medical staff.

These types of systems have been slow to integrate. Surveys (Dorenfest 1987, 1992) of hospitals since 1980 have shown that less than half of community hospitals have full Hospital Information Systems, mainly because few were available to integrate all the functions needed. Research and teaching hospitals presumably have a much higher usage of Hospital Information Systems.

The future is not certain. Several factors are at work:

a) Computer hardware is getting more affordable
b) Computer software is not getting any less expensive
c) Budgets for Hospital Information Systems are generally not expanding
d) Medical caregivers are under pressure to handle more patients on an outpatient basis, reducing hospital census and generally reducing hospital budgets
e) Standards for storing and exchanging patient information have not been agreed on

f) An overall plan for national health care - which could have a big impact on Hospital Information Systems - has been a political football, leading to uncertainty in planning.

2.2 Current System

After the study on the current system in the University Islamic Antarabangsa (UIA), Kuantan Unit Kesihatan, there are so many of the weaknesses in the current system. The study on the current system was made by have an interview with the doctor in UIA, Dr. Jamalludin Ab. Rahman, the Assistant Professor of Department of Community Health. The current system that is being used in the UIA, Kuantan Unit Kesihatan is a manual system. Every step or every process of the current system involved many of paper works. For example, when the patient go to the in patient department for admission or go to the out patient department for the appointment with doctor, they are asking to fill in a list forms in both department and the patient have to fill in his or her personality and the medical records in these forms twice. It means that the same data or the same information of the patient in this hospital existing twice and it will make the patient data to become redundant.

When the patient being transfer into others department, the same data have to be fill in again and again. It is because they are using the traditional file system and all the records have to be duplicated in case something happened on the original copy of the patient data. The other reason for them to duplicate so many copies of the same records in others department in the hospital is because they are not using the integrated traditional filed system. All departments in the hospital will use their own file storage cupboards to store up the patient records.

When the patient came for the appointment with doctor in next visit, the nurses have to find for the previous patient's records and the process of looking

for the previous records is wasting of time. It is because they have to look through all the file storage cupboards to looking for the particular patient's records.

2.3 Existing System of Registration and Billing System

Based on the study on the current system in UIA, Kuantan Unit Kesihatan, there are two (2) existing system which are used to over come the problems of the current system. They are MEDINOUS - Hospital Management System[1] and C-DAC's Sushrut - Hospital Information System (HIS)[2].

2.3.1 MEDINOUS - Hospital Management System

Medinous Health Systems has developed an integrated Hospital Management System (HMS), which addresses all the major functional areas of modern multi-specialty hospitals. Medinous HMS enables better patient care, patient safety, and efficiency and reduced costs. It provides easy access to critical information there by enabling the management to take better decisions on time. The package has been developed on the latest relational database system technology ORACLE 8.0.5 and Visual Basic 6.0. Medinous system provides the benefits of streamlining of operations, enhanced administration and control, improved response, cost control and improved profitability. Medinous can be easily customized to the requirements of any hospital.

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[1] Medinous Health Systems Corp., 1999, Hospital Management System (HMS) <http://www.gatewayinfocity.com/pages/hms.htm>

[2] C-DAC's Sushrut Group, 1997, Hospital Information System (HIS). <http://www.cdacindia.com/html/his/sushrut.asp>

2.3.1.1 Registration Module

This is the registration system that being used by MEDINOUS - Hospital Management System. The Registration module is an integrated patient management system, which captures complete and relevant patient information. The system automates the patient administration functions to have better and efficient patient care process.

a) Patient Registration Details
b) Inpatient and Outpatient Registration
c) Medical Alerts Details
d) Appointment Scheduling (Patient / Doctor wise)
e) Doctor's Schedule Summary
f) Doctors Daily Schedule List
g) Patient Visit History
h) Medical Record Movements
i) Appointments for Radiology tests and Operation Theatre
j) Patient Visit Slip
k) Sponsorship Details

It provides for enquiries about the patient, the patient's location, admission, and appointment scheduling and discharge details. Two screens below show the system interface for the MEDINOUS - Hospital Management System Module Registration.

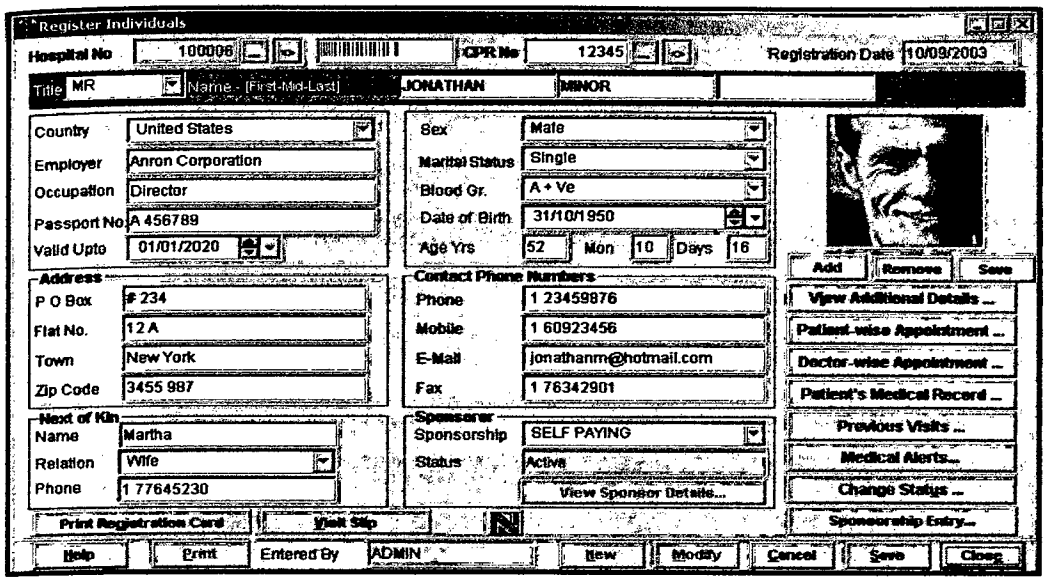

Figure 2.1: System Layout for Medinous Hospital Management System, Registration Modules

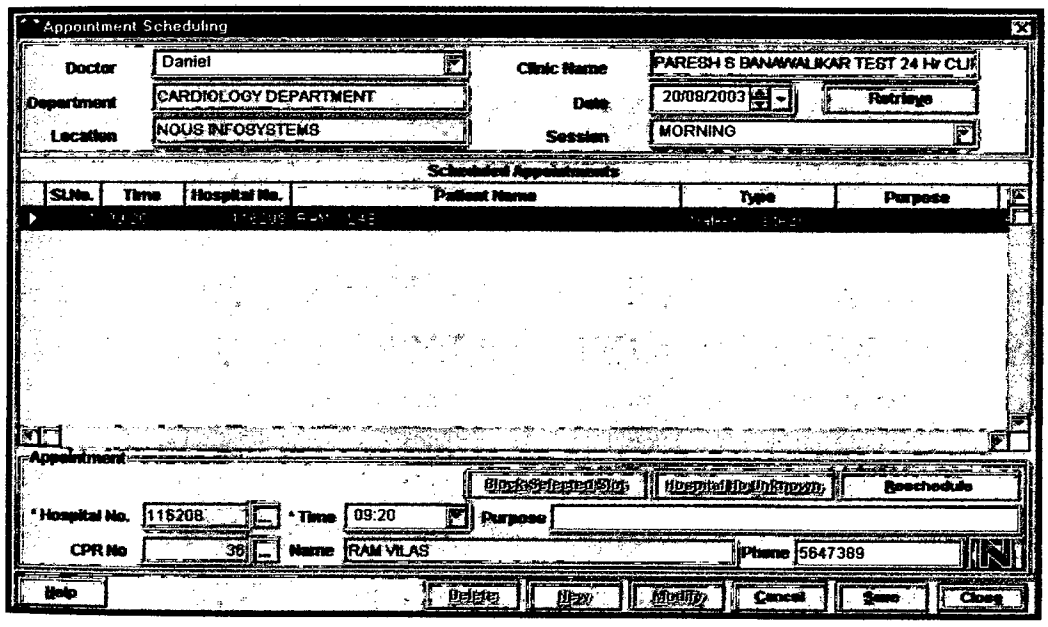

Figure 2.2: System Layout for Medinous Hospital Management System, Registration Modules

2.3.1.2 Billing System Module

The Patient Billing module handles all types of billing for long-term care. This module facilitates cashier and billing operations for different categories of patients like Outpatient, Inpatient and Referral. It provides automatic posting of

charges related to different services like bed charges, lab tests conducted, medicines issued, consultant's fee, food, beverage and telephone charges. This module provides for credit partly billing and can be seamlessly integrated with the Financial Accounting Module. The billing module is extensively flexible by which each of your billing plans can be configured to automatically accept or deny. The system is tuned to capture room and bed charges along with ancillary charges based on the sponsorship category.

The Billing Screens is used for In-Patient and Outpatient Billing and Invoicing. Further more the charges for various services rendered can be recorded through service module and this can be used for billing purposes. Below are the Billing System Features:

a) Payment Modes / Details
b) Sponsorship Conditions Details
c) Patient Billing Details
d) Package Installment
e) Approval from Sponsor
f) Company Sponsorship Details
g) Package Registration
h) Sponsor Verification
i) Automatic Room and Board charges
j) Recurring Ancillary charge capability
k) Auto-generated Codes and Billing Criteria

Figure 2.3 and **Figure 2.4** show the system interface for the MEDINOUS - Hospital Management System Module Registration.

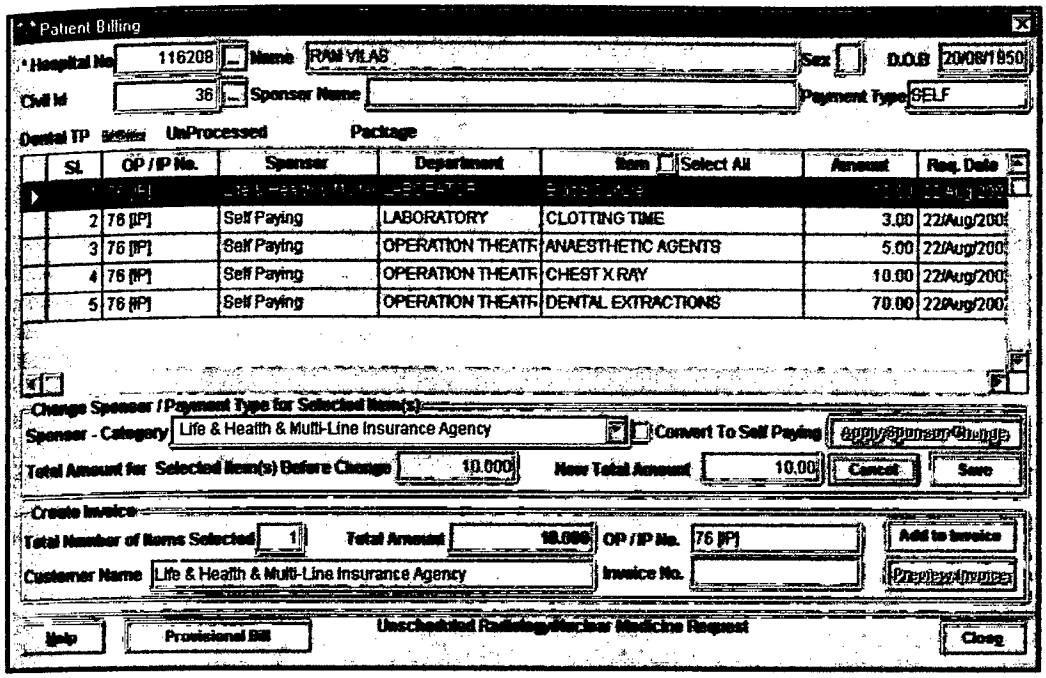

Figure 2.3: System Layout for Medinous Hospital Management System, Patient Billing System Modules

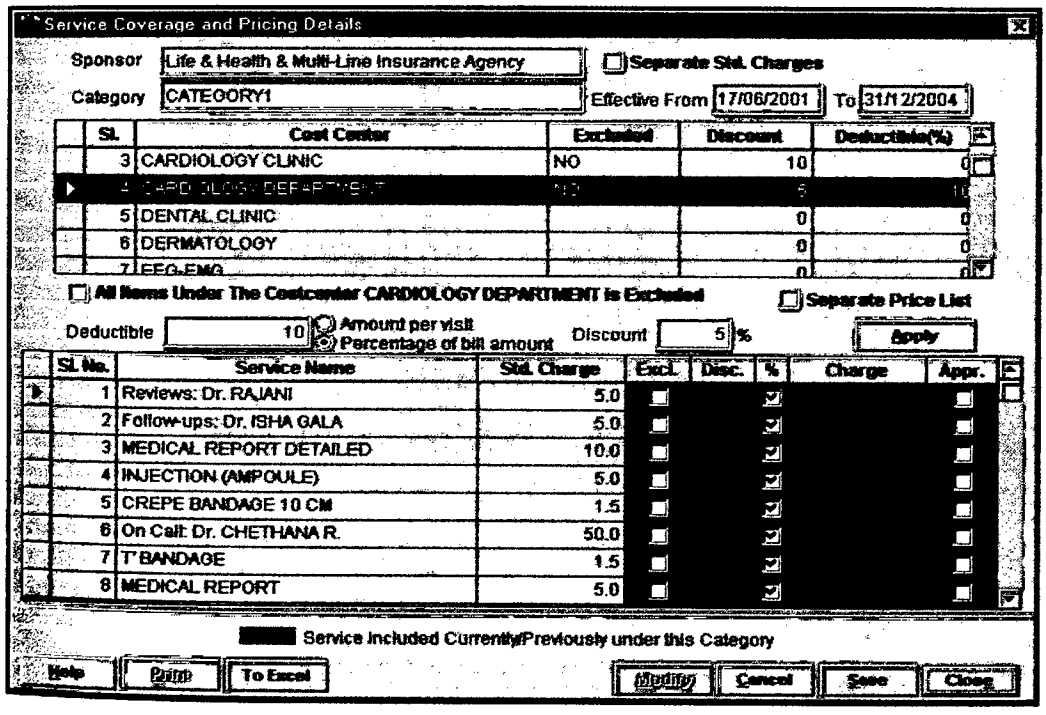

Figure 2.4: System Layout for Medinous Hospital Management System, Patient Billing System Modules

2.3.2 C-DAC's Sushrut - Hospital Information System (HIS)

C-DAC's Sushrut, a Hospital Information System (HIS) has been developed with the objective of streamlining the treatment flow of a patient in the hospital, while allowing doctors and other staff to perform to their peak ability, in an optimized and efficient manner. The HIS developed by C-DAC is modular, thus ensuring sustained benefits through changes in technology, protecting and providing optimal returns from the investment. It is modeled on a unique combination of a 'patient centric and medical staff centric' paradigm, beneficial to the recipients and the providers of healthcare.

2.3.2.1 Registration Module for C-DAC's Sushrut - Hospital Information System (HIS).

Registration of the patient is the foremost activity in the overall Hospital Information System. Every patient who approaches a hospital has to get registered prior to getting any consultation, treatment, and investigations done from the hospital. Registration of patients involves accepting certain general and demographic information about the patient. The patient is given a unique central registration number. The Patient is also given a patient identification card, known as Registration Card. Different categories of Registrations are:

a) Normal
b) Staff
c) Emergency
d) VIP/Senior Citizen

Normal registrations are done in the routine Out Patient Department (OPD) timings. Emergency Registration is done for the patients who require immediate medical attention. The patients getting registered under this category are basically:

a) Out-patients whose unit is not working on that day
b) Medico-Legal Cases
c) Patients requiring immediate medical attention

Patients coming after the OPD hours also are registered as Emergency Patients. Staff Registration takes care of the registrations related to all the staff members of the hospital. Input/Screen Interfaces:

a) Capturing Demographic Details: The Registration module captures the demographic details of the patient. A patient is assigned a unique 12 digit Central Identification Number.
b) Visit Creation for the Old Patients: Every time a patient visits the hospital after registering, the visit gets stamped.
c) Change of Department: This facility is provided to record the change of the department, in which the patient is registered.
d) Duplicate Card Printing: Since the OPD card tends to get filled there is a facility to reprint this card.
e) Modification Request: There is a provision to handle subsequent modification requests in registration data.

2.3.2.2 Billing Module for C-DAC's Sushrut - Hospital Information System (HIS)

The Billing module deals in collection of money for services availed by a patient. The module works in two (2) ways:

a) Money can be collected in cash for outpatient services availed.
b) Advance can be collected when a patient is to be admitted. In this case the billing module maintains the status of each in-patient's account. The account is finally settled when the patient is discharged.

The module consists of the following sub-modules:

a) Cash Collection
b) Account Maintenance
c) Billing Reports

The module depends on the:

a) Investigation: Requisition module for test details to be billed. In-patient modules for admission details, expenses incurred during stay and discharge settlement to be billed.
b) Registration: Module for registration charges to be billed.

Salient features:

a) Cash Collection which involved collects cash for OPD tests, Blood requisition, Admission Advance and Other Misc. tariffs.
b) Prints Billing Clerk wise/Billing terminal wise and overall cash collection statements for a given period.
c) Account Maintenance which involved maintains a list of all expenses incurred by an admitted patient. Besides, it uses this list to settle the patient's account when the patient is discharged. Other than that, provision to bill a patient against another account (LIC account/company account/Chief Minister's fund etc.) is also available. It also generates reports like tariff-wise/department-wise/IP or OP wise collections and generates reports up to the trial balance stage.

2.4 Advantages and Weakness of Existing System

Basically there are a few advantages and weaknesses of the existed system.