Macau Polytechnic Institute

School of Public Administration

Computer Studies Program

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Applied Computing Project I
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Systems Analysis and Design of Clinic Management System

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PART I – INTRODUCTION

Description

This is a medical management system, assisting user to administer a huge data in clinic. In addition, another function is allowing doctor, nurses and the administrative staff. On the client point of view, this is a faster and easeful way to link to the healthcare service by using the system.

'Clinic Management System - CMS' is specially designed for general clinic, this system let them have a high efficiency management tools, computerize and systematic patients record, detail of drug information, this is the first achievements of the medical services.

Medical services computerize is an irresistible general trend, this web site will provide medical information for the client, the user can find out a message they care.

CMS provide on line appointment feature, which allow patients to make the appointment through Internet. Furthermore, doctors can manage the clinic daily work by using CMS.

Functions of the System

Patient Function

- CMS – allow patients to browse the doctor's schedule. In order to supply a direct appointment way on web, this feature provide a convenience practice which can avoid telephone line busy, or time consuming which cause by forming line at the clinic. CMS will show out the doctors' schedule of the current month, the patients only need to select the appropriate doctor whom they want to see. The patient will clearly know their occupied time.

- Making appointment is several simple steps. The patients can log in by using the User ID and Password, which are written on the consultation card. For the first time to log in, the patients can register on the web site and get their own ID and Password.

- Each patient owns his consultation card, Doctors and patients can use their consultation card number to check and review the Medical history.

- The Patients can check their own Medical history through the web browser, which include the patient info, such as Name, address, age, sex, blood group, record of diagnose, any allergic reaction.

Staff (Doctor & nurse) Function

- CMS provides the calendar for the doctors, to check the calendar and appointment. In addition, the medical history are stored in the database. The doctor can use the hyperlink through the patients' names to the patient personal data and medical history.

- The calendar allows the staff to apply different kind of leave. For instance, annual leave or non-paid leave, etc.

- By using the system, the medicine records can be checked; they can view the information of the medicines such as Medicines name, Expired date, Prices, Supplier info (Address and contact number) and Description.

- During the meeting, the doctor can store the patient treatment into the database, such as patient diagnosis, medicines, drug allergy, chronic disease. After the meeting or checking, the doctor will input the information and status in the system. If the patients are needed the injection, the updated records will transfer to the nurse for preparation. Finally the system will calculate the total amount and print out the receipts.

- Computerize and centralize the patient's medical history in the database.

Administrator's Function

- The system divides different level of rights. For the administrator, he can control and amend the user information such as user's name, password, and user rights. In addition, the administrator has the right to change any scheduled of appointment or duty of the staffs.

- The system provides many kind of reports for administrator to manage and coordinate, such as Medical history report, medicines report, patient reports.

- Administrators allow doing the backup for the system (scheduling or customizing).

Note: If any user wants to change the password of the login ID. He or she can change his or her password on the Web site. If the user forgot the password, which condition is kept to administrator to reset.

Meeting Query Policy

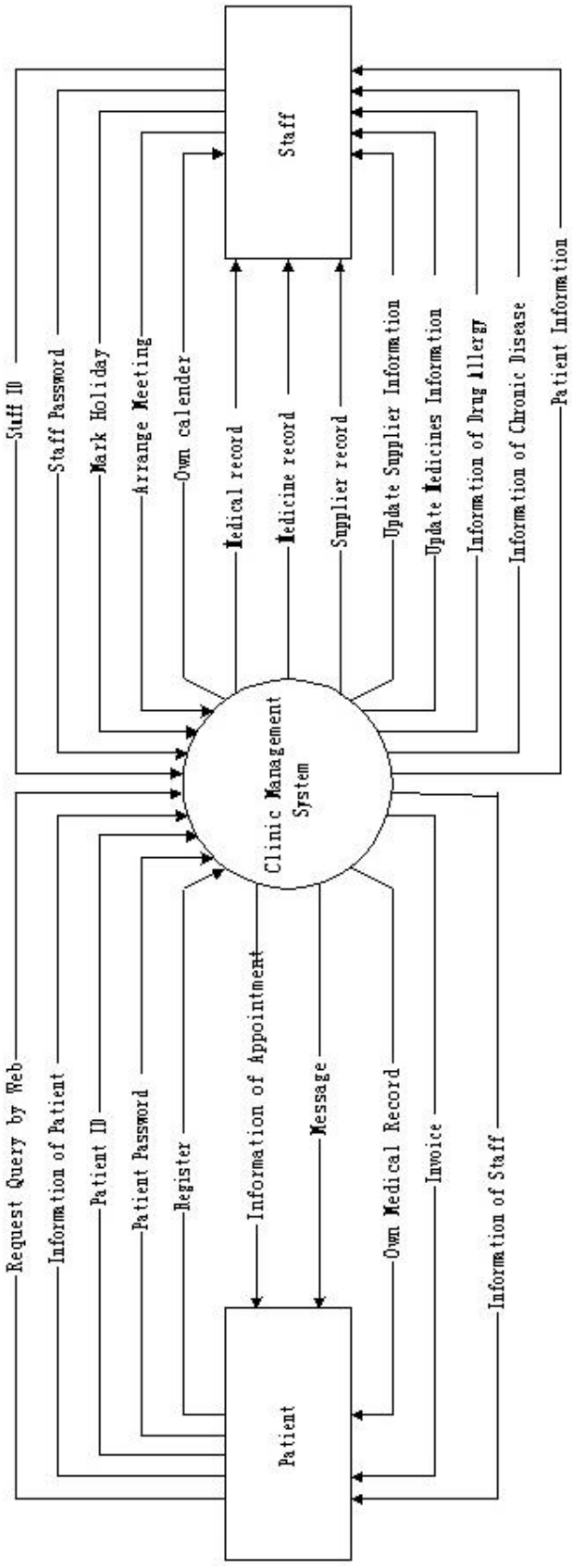
- For Patient. If the patient is late, the vacancy automatically gave to another following patient. Then his appointment will schedule to the end of the queue, or if the middle of the queue has a hole (that's means the patient also came late or that time has no booking) then the patient could insert into the middle of the queue. Otherwise the patient arrived early and has a vacancy, he or she could meet the doctor immediately otherwise he will wait at your own time. If the Patient does not appeared in the surgery on the date of booked appointment, the system would automatically cancel the record of the appointment.
- For Doctor. When a doctor has arrived late or has not appeared in the surgery, the process will be manually control, that's the doctor must be arranged with patients to book to another time or date.
- For Nurse. When a nurse has arrived late or has not appeared in the surgery, the process of the nurse could be controlled or accessed by doctor.

Note: The above process is a manual control.

PART II – PROCESS ANALYSIS

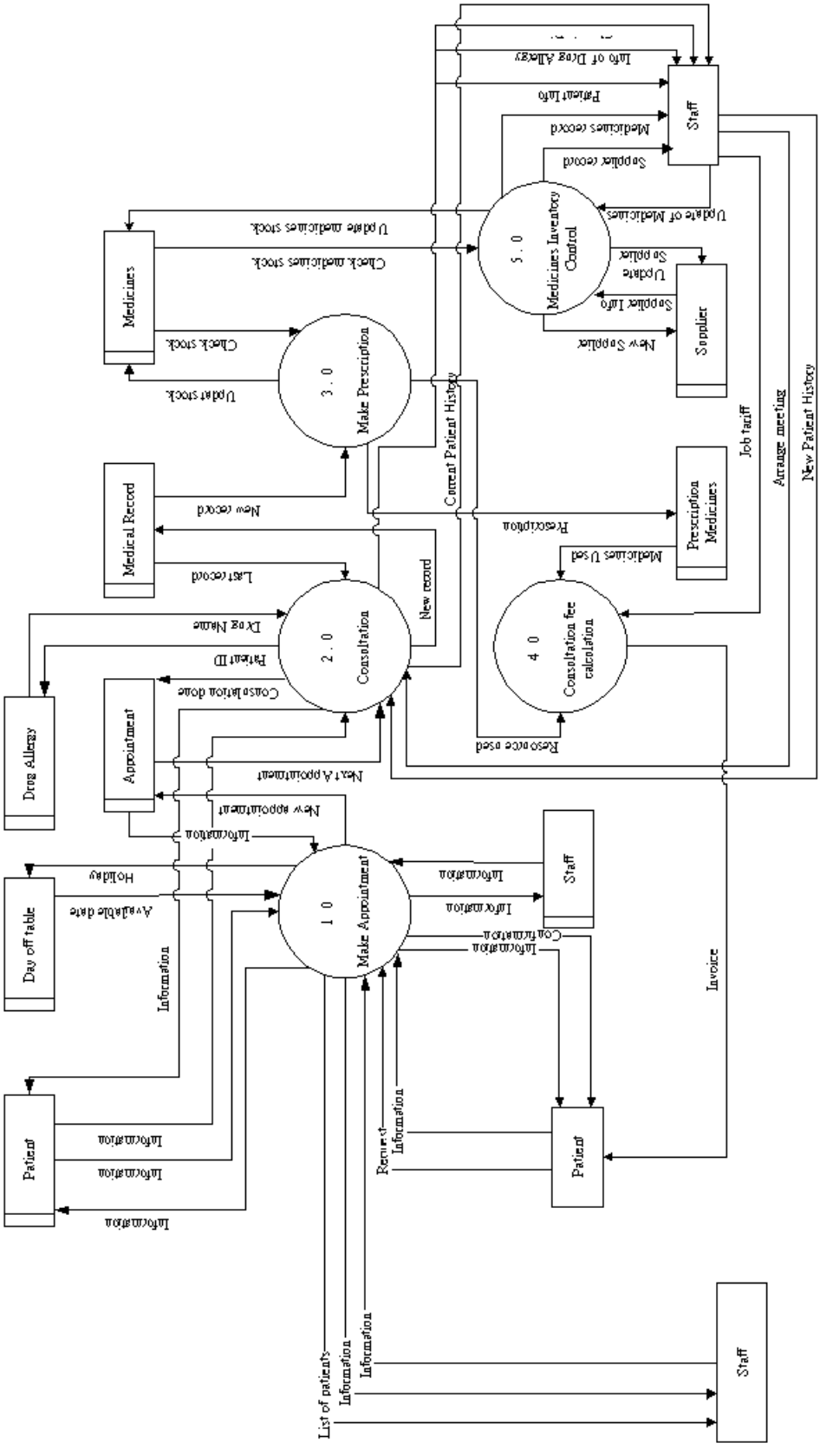
Data Flow Diagram

Level 0 – Context Diagram



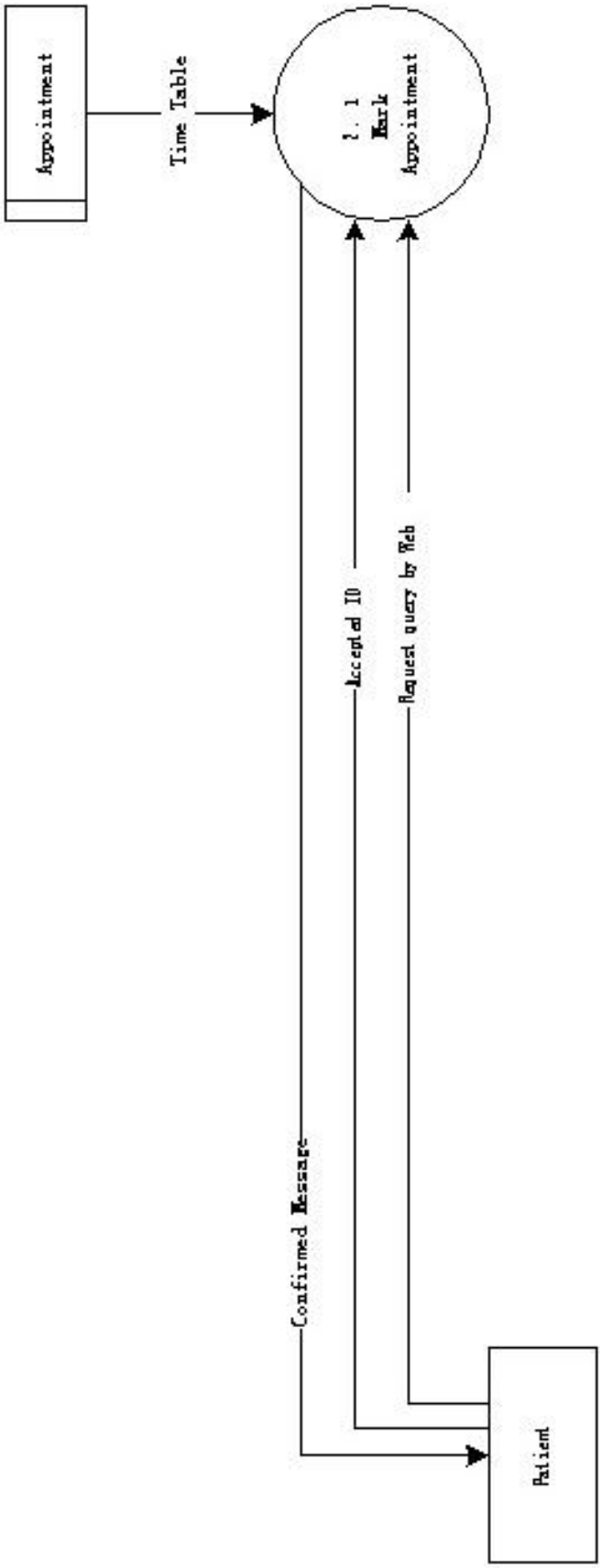
Data Flow Diagram

Level 1



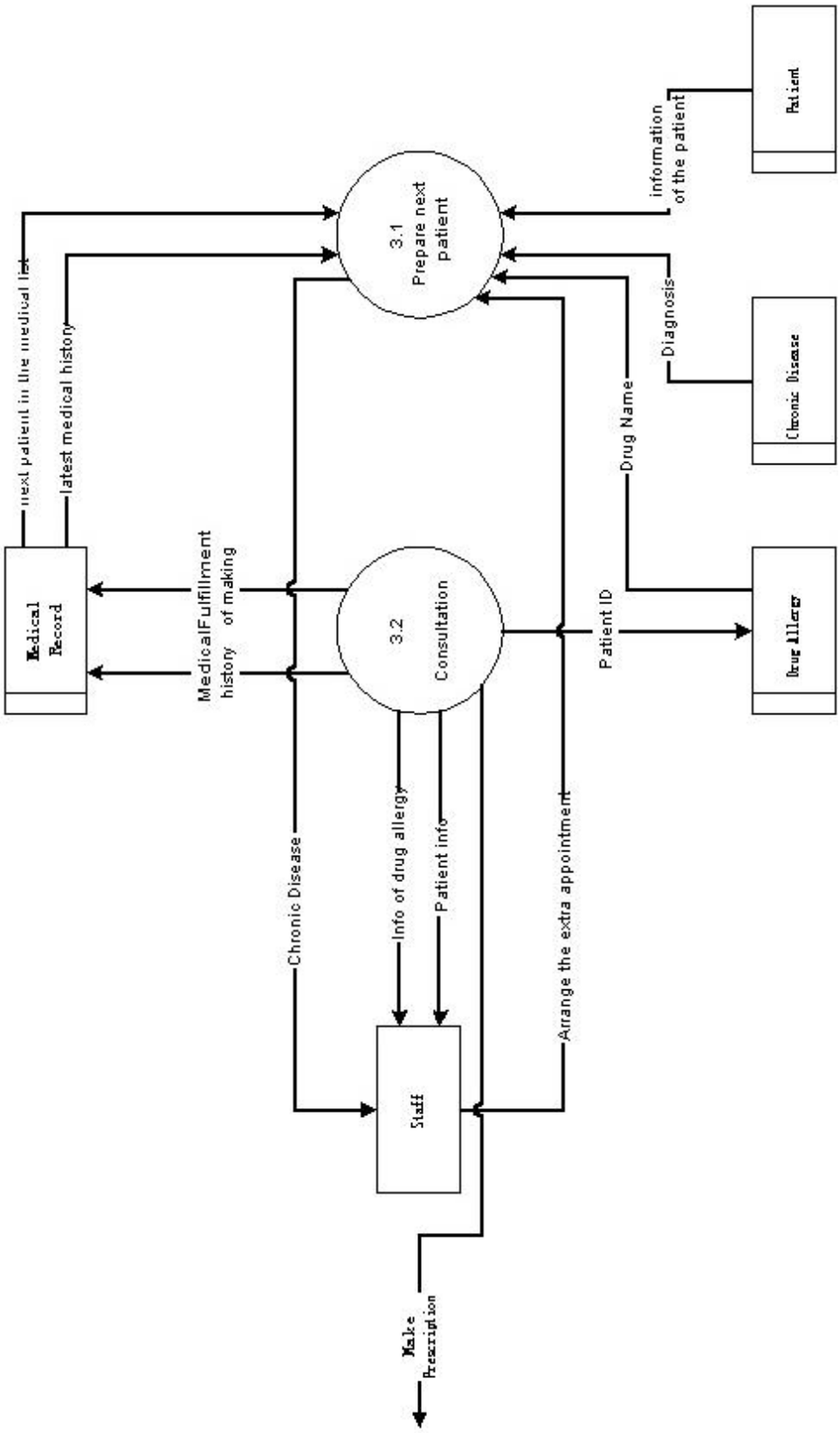
Data Flow Diagram

Level 2 – Make Appointment



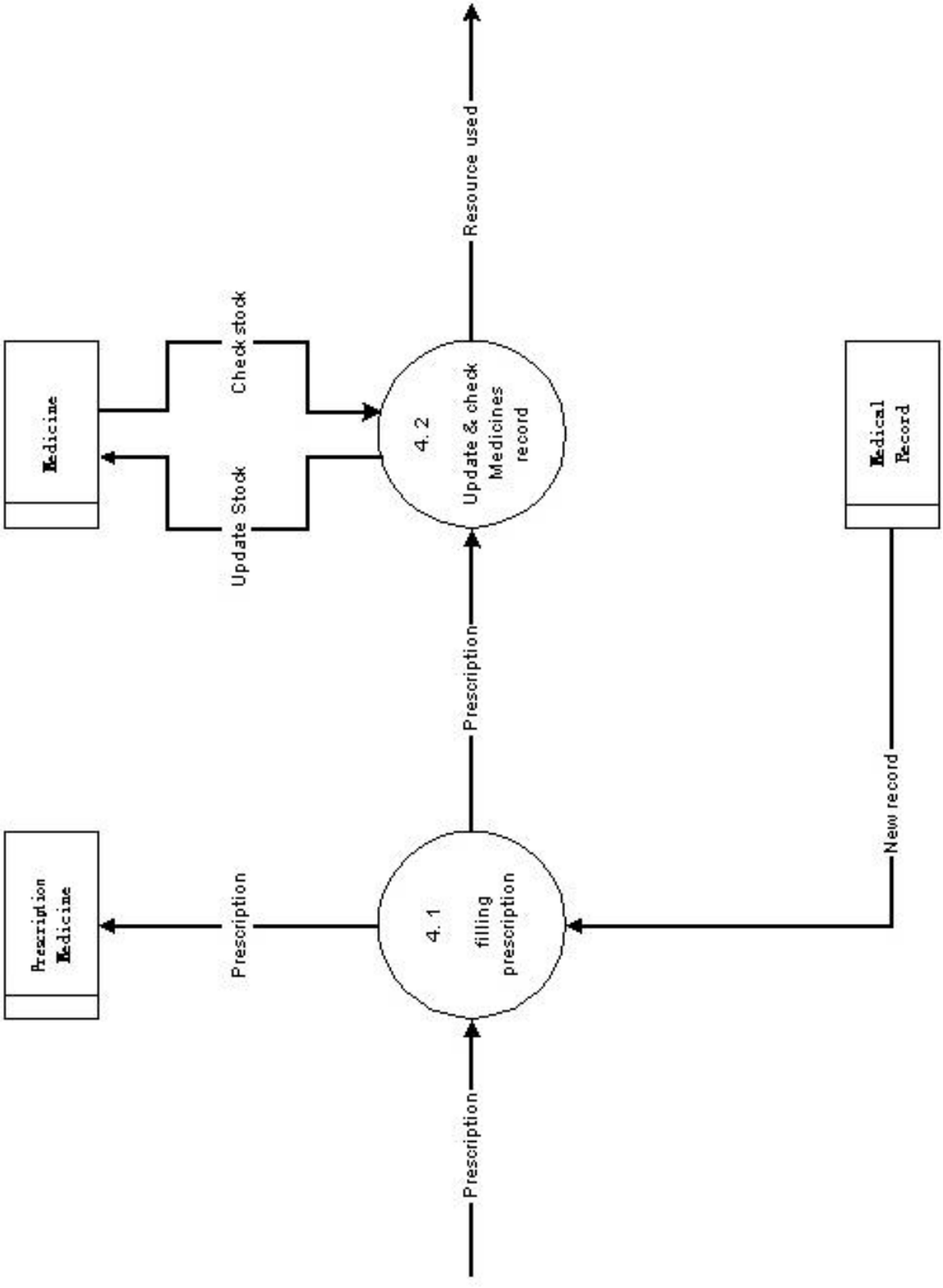
Data Flow Diagram

Level 2 - Consultation



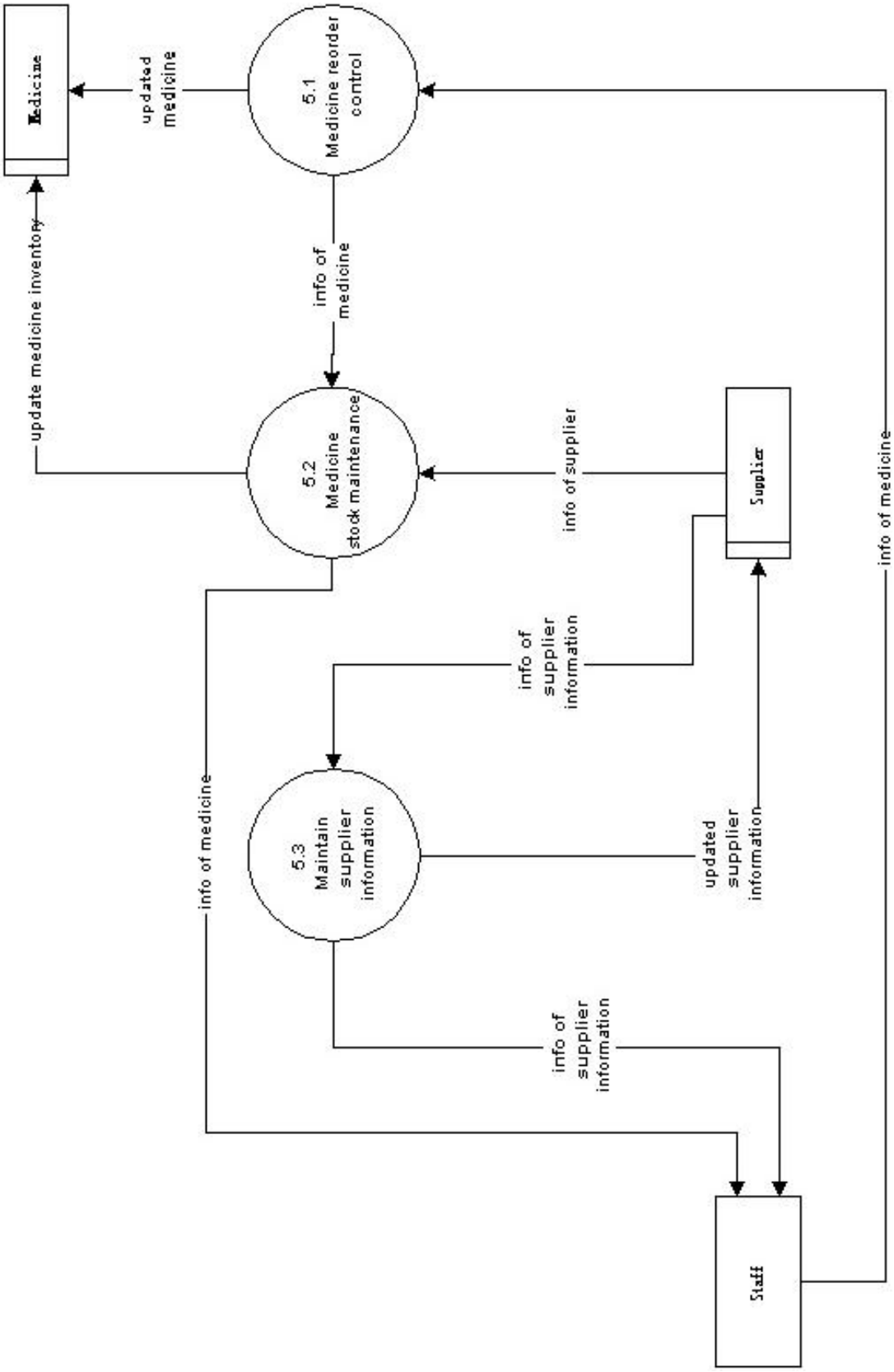
Data Flow Diagram

Level 2 – Make Prescription



Data Flow Diagram

Level 2 – Medicines Inventory Control



DATA DICTIONARY

Process Dictionary

Level 1

Name:	1.0 Access to Online Information
Description:	Provide the medical information for each patient by web.

Name:	2.0 Make Appointment
Description:	Patient requirement is received and is confirmed for further processing.

Name:	3.0 Consultation
Description:	Provide the consultation for each patient.

Name:	4.0 Make Prescription
Description:	Keep the record of medicines of each patient.

Name:	5.0 Medicines inventory control.
Description:	Updates the medicine receives file and control the reorder point.

Level 2

a) Make Appointment Process

Name:	2.1 Mark Appointment
Description:	Mark the available date and time, based on the timetable.

b) Consultation Process

Name:	3.1 Prepare next patient
Description:	Show the information of next patient after each consultation.

Name:	3.2 Consultation
Description:	Doctor provides the consultation.

c) Make Prescription Process

Name:	4.1 Filling prescription
Description:	Filling prescription to each patient.

Name:	4.2 Update & check medicines record
Description:	Update & check the medicines, which is the user's use.

d) Medicines Inventory Control Process

Name:	5.1 Medicine reorder control
Description:	Control the medicines reorder point and update the medicine received file.
Inbound Data Flow:	Medicine data
Outbound Data Flow:	Medicine received data

Name:	5.2 Medicine stock maintenance
Description:	Maintain the medicine stock data.
Inbound Data Flow:	Medicine received data
Outbound Data Flow:	Medicine data

Name:	5.3 Maintain suppliers information
Description:	Maintain the information of supplier.
Inbound Data Flow:	Information of medicine received
Outbound Data Flow:	Supplier data

Data Flows Dictionary

Level 1 – 1.0 Make appointment

Name:	Confirmation
Description:	After the booking of appointment the system will prompt a message to confirm that booking is booked.
Data Structure:	Day off, Appointment

Name:	Checking
Description:	Check the appointment file to confirm the doctor is available or not.
Data Structure:	Staff ID, Date, Time

Name:	Adding
Description:	Mark the time reserve to that patient.
Data Structure:	Staff ID, Date, Time, Patient ID

Name:	Old patient
Description:	Confirm the patient ID's existence.
Data Structure:	Patient ID.

Name:	New patient
Description:	Add the personnel detail of the new patient.
Data Structure:	Patient ID, Patient detail.

Name:	Add appointment
Description:	The Nurse in the detail of each appointment.
Data Structure:	Patient ID, Date, Time, Staff ID.

Name:	Check information
Description:	Check the doctor ID while making the appointment.
Data Structure:	Staff ID.

Name:	Adding Information
Description:	Add, delete or update information of the staff file.
Data Structure:	Staff ID, Staff detail.

Name:	Check available date
Description:	Check the day of the doctor's available.
Data Structure:	Staff ID, Date, Shift.

Name:	Check holiday
Description:	Check the appointment date is public holiday or not. No service provides on public holiday.
Data Structure:	Date.

Level 1 – 2.0 Consultation

Name:	Old information
Description:	Retrieve the patient's diagnosis while doing consultation.
Data Structure:	Patient ID, Patient diagnosis.

Name:	New information
Description:	Update the patient's diagnosis after consultation.
Data Structure:	Patient ID, Patient diagnosis.

Name:	Current patient history
Description:	Hardcopy of patient medical history to the nurse for filing.
Data Structure:	Medical record.

Name:	New patient history
Description:	Nurse type in the new medical history after consultation.
Data Structure:	Medical record.

Name:	Old record
Description:	Retrieve the last medical history of that patient while consultation.
Data Structure:	Medical record.

Name:	New record
Description:	Add the new medical history of that patient.
Data Structure:	Medical record.

Name:	Consultation done
Description:	Mark the appointment file after consultation done.
Data Structure:	Consultation Done.

Name:	Next appointment
Description:	Check the next appointment.
Data Structure:	Appointment data.

Name:	Patient ID
Description:	Check the Patient has any drug allergy.
Data Structure:	Drug allergy

Name:	Drug Allergy
Description:	Show the patient which drug has allergy
Data Structure:	Drug allergy

Level 1 – 3.0 Make prescriptions

Name:	Check stock
Description:	Check the stock of each medicine while doctor issue. If out of stock, give a message.
Data Structure:	Medicine data.

Name:	Update stock
Description:	After doctor confirm to issue each medicine update the stock automatically.
Data Structure:	Medicine Stock.

Name:	Prescription
Description:	Add the medicine used data while doctor prescribe a medicine.
Data Structure:	Medicine Used Detail.

Name:	New record
Description:	Get the medical record after the consultation
Data Structure:	Medicine data

Name:	Resource used
Description:	Record what source the patient used
Data Structure:	Resource Used Detail.

Level 1 – 4.0 Medicines Inventory Control

Name:	Updated medicine stock
Description:	Add, delete and update the information of medicine file.
Data Structure:	Medicine Detail, Stock.

Name:	Check medicine stock
Description:	Confirm the stock while the doctor issues each medicine.
Data Structure:	Medicine Detail, Stock.

Name:	Check purchased medicines
Description:	Check the reorder point of each medicine each period.
Data Structure:	Medicine Received Data.

Name:	Medicine received
Description:	After medicine received, update the medicine received file.
Data Structure:	Medicine Received Detail.

Name:	Resource used
Description:	Provide the detail of resource used.
Data Structure:	Resource used detail.

Name:	Existing suppliers
Description:	Provide the detail of the existing supplier.
Data Structure:	Supplier ID, Supplier Detail.

Name:	New suppliers
Description:	Add, delete & update the details of supplier.
Data Structure:	Supplier ID, Supplier Data.

Name:	Stock status
Description:	Print the report about the stock status of each medicine weekly.
Data Structure:	Medicine detail.

Level 2 – 1.0 Make Appointment Data Flow

Name:	Request by Web
Description:	Patient requires to make an appointment.
Data Structure:	Patient

Name:	Confirmed message
Description:	After the booking of appointment the system will prompt a message to confirm that booking is booked.
Data Structure:	Day off, Appointment

Name:	Accepted ID
Description:	Confirm the patient's existing.
Data Structure:	Patient Data.

Name:	Time table
Description:	Which timetable is combined with Day off of each doctor and booked appointment.
Data Structure:	Day off table, appointment.

Level 2 – 2.0 Consultation Data Flow

Name:	Old information of the patient
Description:	Retrieve the patient diagnosis.
Data Structure:	Patient ID, Patient Diagnosis.

Name:	Next patient in the appointment list
Description:	Check the next appointment.
Data Structure:	Appointment Data.

Name:	Diagnosis information of the patient
Description:	Ready to do the consultation.
Data Structure:	Appointment Data.

Name:	Fulfillment of mark
Description:	Mark the appointment file after consultation done.
Data Structure:	Consultation Done.

Name:	Update patient info after consultation
Description:	Update the patient diagnosis of after consultation.
Data Structure:	Patient ID, Patient Diagnosis.

Name:	Latest medical history
Description:	Retrieve the latest medical history of that patient while consultation.
Data Structure:	Medical History.

Name:	Updated medical history
Description:	Add the new medical history of that patient.
Data Structure:	Medical History.

Name:	Drug Name
Description:	When in consultation, check the information about the patient.
Data Structure:	Drug Allergy.

Name:	Patient Name
Description:	Check the patient about the drug allergy
Data Structure:	Drug Allergy.

Name:	Chronic Disease
Description:	When in consultation, check the information about the patient.
Data Structure:	Medical record.

Name:	Info of drug allergy
Description:	When in consultation, check the information about the patient.
Data Structure:	Drug allergy

Name:	Patient info
Description:	When in consultation, check the information about the patient.
Data Structure:	Patient data

Level 2 – 3.0 Make Prescription Data Flow

Name:	Prescription
Description:	Update the new prescription for each patient
Data Structure:	Prescription medicines

Name:	Prescription
Description:	Pass the prescription in the next process
Data Structure:	Prescription medicines

Name:	New record
Description:	After the consultation record the patient condition
Data Structure:	Prescription medicines

Name:	Check stock
Description:	Check the stock of each medicine while doctor issue. If out of stock, give a message.
Data Structure:	Medicine Data.

Name:	Update stock
Description:	After doctor confirm to issue each medicine update the stock automatically.
Data Structure:	Medicine Stock.

Name:	Resource used
Description:	After the update & check medicines record pass the used resource in next process
Data Structure:	Medicines stock

Level 2 – 4.0 Medicines Inventory Control Data Flow

Name:	Check medicine in stock
Description:	Check the stock while the doctor issues each medicine.
Data Structure:	Medicine Data

Name:	Update medicine received
Description:	After medicine received, update the medicine-received file.
Data Structure:	Medicine Received Detail

Name:	Update medicine inventory
Description:	Add, delete and update the information of medicine file.
Data Structure:	Medicine Detail

Name:	Check what medicine is received
Description:	Provide the medicine-received information to write report.
Data Structure:	Medicine Received Data

Name:	Medicine stock report
Description:	Print the report about the stock status of each medicine to control the reorder.
Data Structure:	Medicine Detail.

Name:	Update suppliers information
Description:	Add, delete and update the details of suppliers.
Data Structure:	Supplier ID, Supplier Data.

Name:	Maintain suppliers information
Description:	Add, delete and update the details of supplier's information by the staff.
Data Structure:	Supplier ID, Supplier Data.

Name:	Medicine quantity
Description:	Provide the detail of medicine file to print the report.
Data Structure:	Medicine Detail.

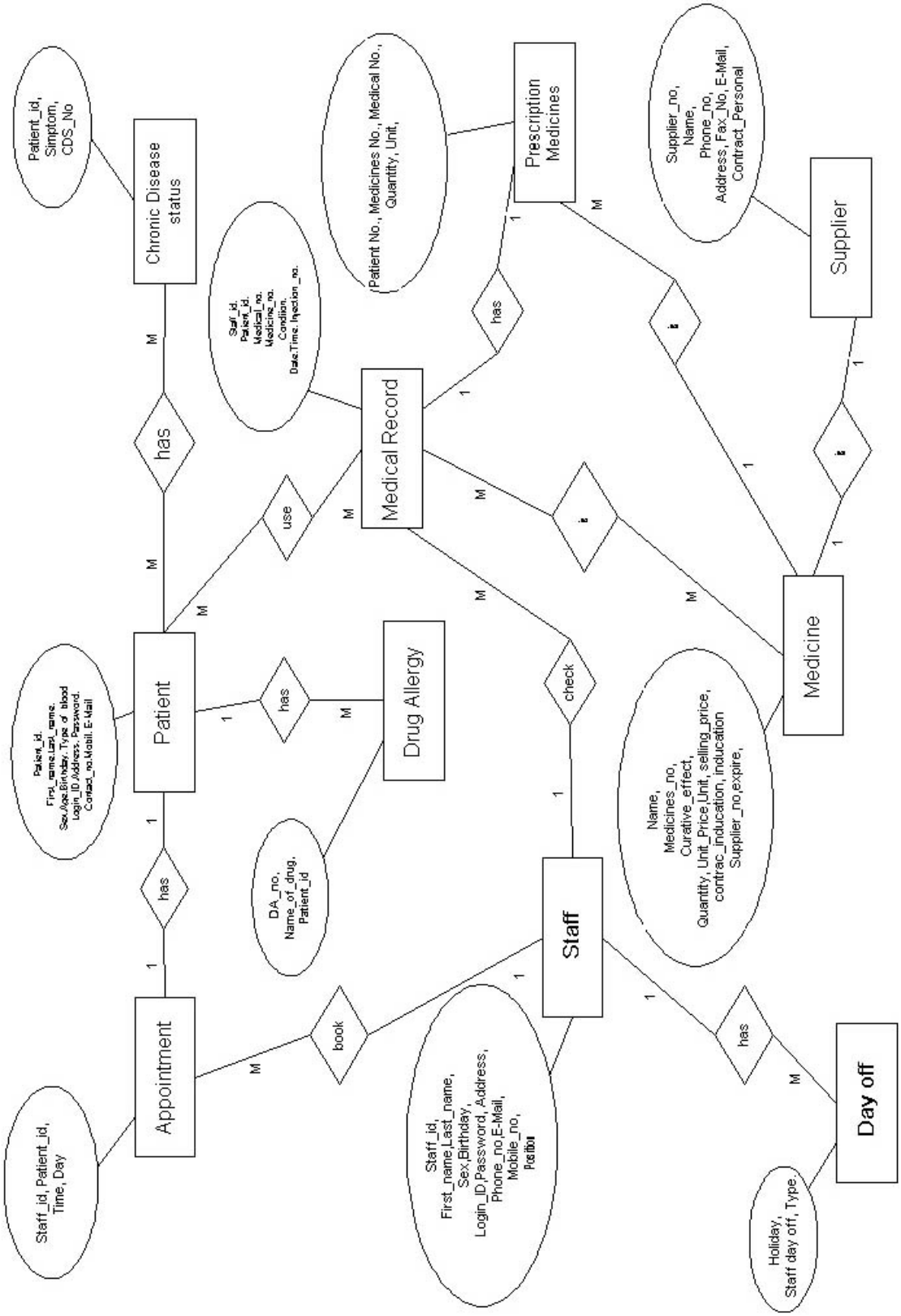
Name:	Retrieve suppliers information
Description:	Provide the detail of the existing supplier.
Data Structure:	Supplier ID, Supplier Detail.

Name:	Medicine stock report
Description:	Print the medicine stock report to the nurse to control the reorder.
Data Structure:	Medicine Detail.

Name:	Medicine stock report
Description:	Print the medicine stock report to the doctor for reference.
Data Structure:	Medicine Detail.

PART III – DATA ANALYSIS

ER Diagram


Patient_id, Simptom, CDS_No
Chronic Disease status
Patient No., Medicines No., Medical No., Quantity, Unit,
Prescription Medicines
Supplier_no, Name, Phone_no, Address, Fax_No, E-Mail, Contract_Personal
Supplier
Staff_id, Patient_id, Medical_no, Medicine_no, Condition, Date,Time, Injection_no.
has
is
use
Medical Record
Patient_id, First_name,Last_name, Sex,Age,Birthday, Type of blood Login_ID,Address, Password, Contact_no,Mobil, E-Mail
Patient
has
Drug Allergy
check
Medicine
Name, Medicines_no, Curative_effect, Quantity, Unit_Price,Unit, selling_price, contrac_inducation, Inducation Supplier_no,expire,
DA_no, Name_of_drug, Patient_id
has
Staff
Staff_id, Patient_id, Time, Day
Appointment
book
Staff_id, First_name,Last_name, Sex,Birthday, Login_ID,Password, Address, Phone_no,E-Mail, Mobile_no, Position
has
Day off
Holiday, Staff day off, Type
1
M

PART IV – DATA SCHEMA DESIGN

TABLE RELATIONSHIP DESIGN

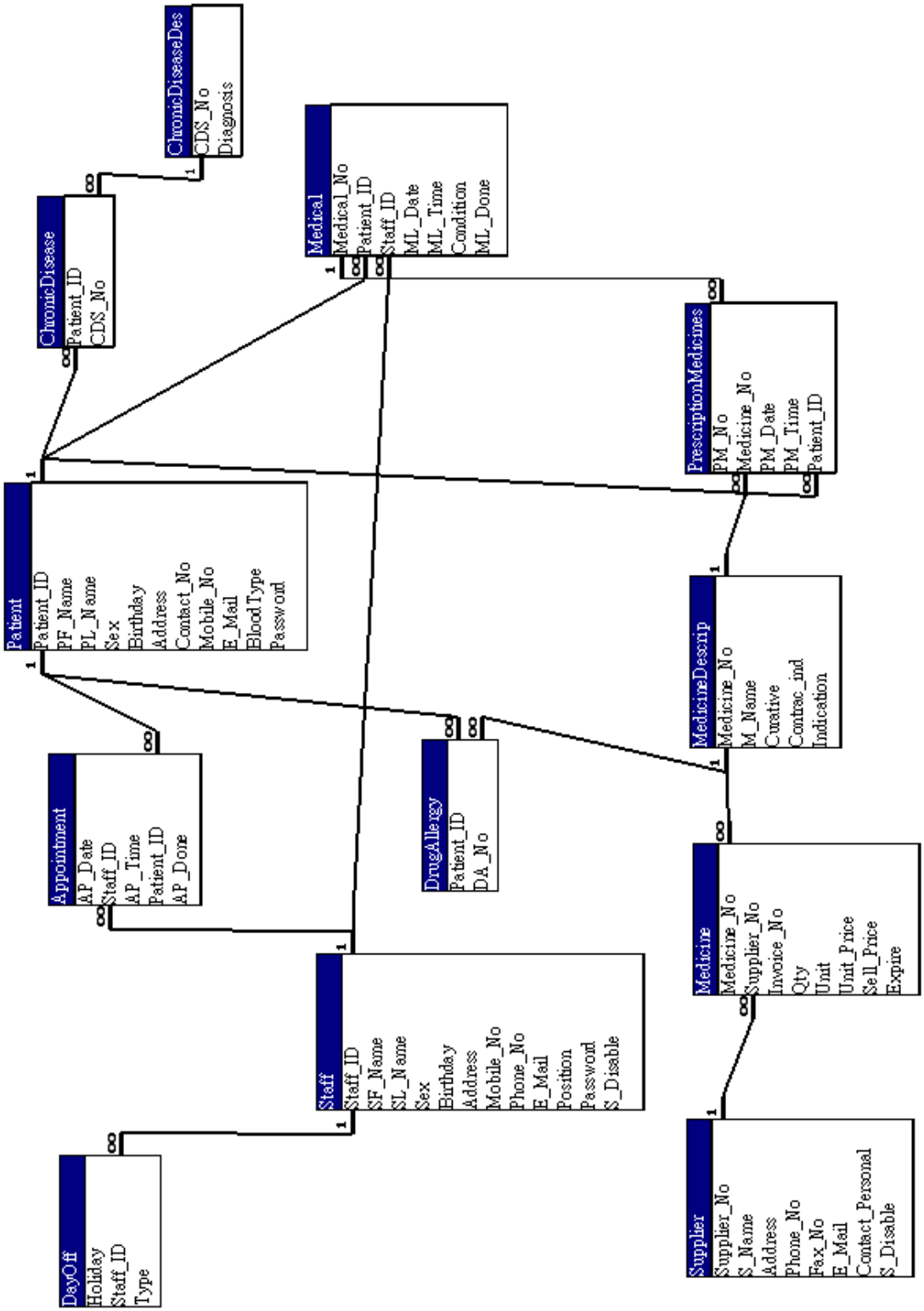


TABLE STRUCTURE

DayOff Table

Field Name	Type	Validation rules
Holiday	Date/Time	YYYYMMDD is Primary Key
Type	Char (1)	D/N/O/A/P is Primary Key
Staff_ID	Char (5)	Between D/N/O0001 and D/N/O9999 is Foreign Key reference by Staff Table

Staff Table

Field Name	Type	Validation rules
Staff_ID	Char (5)	Between D/N/O/A0001 and D/N/O/A9999 is Primary Key
SF_Name	Char (15)	
SL_Name	Char (15)	
Sex	Char (1)	M or F
Birthday	Date/Time	YYYYMMDD
Address	Char (40)	
Mobile_No	Integer(10)	
Phone_No	Integer(13)	
E-mail	Char (30)	Should be in "@"
Position	Char (20)	
Password	Char (10)	Not Null
S_Disable	Boolean	T or F

Appointment Table

Field Name	Type	Validation rules
AP_Date	Date/Time	YYYYMMDD is Primary Key
AP_Time	Date/Time	HHMM is Primary Key
Staff_ID	Char (5)	Between D/N/O0001 and D/N/O9999 is Primary Key is Foreign Key reference by Staff Table
Patient_ID	Char (8)	Between P0000001 and P9999999 is Foreign Key reference by Patient Table
AP_Done	Boolean	T or F

Supplier Table

Field Name	Type	Validation rules
Supplier_No	Char (3)	Between S01 and S99 is Primary Key
S_Name	Char (20)	
Phone_No	Integer(13)	
Address	Char (40)	
Fax_No	Integer(13)	
E_Mail	Char (30)	Should be in "@"
Contact_Personal	Char (20)	
S_Disable	Boolean	T or F

_PatientTable

Field Name	Type	Validation rules
Patient_ID	Char (8)	Between P0000001 and P9999999 is Primary Key
PF_Name	Char (15)	
PL_Name	Char (15)	
Sex	Char (1)	M or F
Birthday	Date/Time	YYYYMMDD
Address	Char (40)	
Contact_No	Integer(13)	
Mobile_No	Integer(10)	
E_Mail	Char (30)	Should be in "@"
BloodType	Char (2)	A, A+, B, B+, AB , O, O+
Login_ID	Char (8)	
Password	Char (10)	Not Null

Medicine Table

Field Name	Type	Validation rules
Medicine_No	Char (8)	Between AAA00001 and ZZZ99999 is Primary Key
Invoice_No	Char(	Between AAA0001 and ZZZ0001
Qty	Integer (3)	Between 001 and 999
Unit	Char (5)	PCS, DOZ, ML, C.C.
Unit_Price	Float (4,2)	Between 0000.01 and 9999.99
Sell_Price	Float (5,1)	Between 00000.1 and 99999.9
Supplier_No	Char (3)	Between S01 and S99 is Foreign Key is reference by Supplier Table
Expire	Date/Time	YYYYMMDD

MedicineDescrip Table

Field Name	Type	Validation rules
Medicine_No	Char (8)	Between AAA00001 and ZZZ99999 is Primary Key
M_Name	Char (30)	
Curative	Char (20)	
Contrac_ind	Memo	
Indication	Memo	

Prescription Medicines Table

Field Name	Type	Validation rules
PM_No	Char (8)	Between PM000001 and PM999999 is Primary Key
Patient_ID	Char (8)	Between P0000001 and P9999999 is Foreign Key reference by Patient Table
Medicine_No	Char (8)	Between AAA00001 and ZZZ99999 is Foreign Key reference by Medicine Table
Medical_No	Integer (8)	Between 00000001 and 99999999 is Foreign Key reference by Medical Table
PM_Date	Date/Time	YYYYMMDD
PM_Time	Date/Time	HH:MM
Qty	Integer (3)	Between 001 and 999
Unit	Char (5)	PCS, DOZ, ML, C.C.

Chronic Disease Table

Field Name	Type	Validation rules
Patient_ID	Char (8)	Between P0000001 and P9999999 is Primary Key is Foreign Key reference by Patient Table
CDS_No	Char (8)	Between C0000001 and C9999999 is Primary Key

Chronic DiseaseDescrip Table

Field Name	Type	Validation rules
CDS_No	Char (8)	Between C0000001 and C9999999 is Primary Key
Diagnosis	Memo	

Drug Allergy Table

Field Name	Type	Validation rules
Patient_ID	Char (8)	Between P0000001 and P9999999 is Primary Key is Foreign Key reference by Patient Table
DA_No	Char (8)	Between DA000001 and DA999999 is Primary Key

Medical Table

Field Name	Type	Validation rules
Medical_No	Integer (8)	Between 00000001 and 99999999 is Primary Key
Patient_ID	Char (8)	Between P0000001 and P9999999 is Foreign Key reference by Patient Table
Staff_ID	Char (5)	Between D/N/O0001 and D/N/O9999 is Foreign Key reference by Staff Table
ML_Date	Date/Time	YYYYMMDD
ML_Time	Date/Time	HHMM
Condition	Memo	
ML_Done	Boolean	T or F