DESIGN AND DEVELOPMENT OF A PROTOTYPE MEDICINE STOCK SYSTEM, A CASE STUDY OF AN OUT-PATIENT DEPARTMENT OF A GENERAL HOSPITAL

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ABSTRACT

The objective of this research was to design and develop a prototype medicine stock system for an out-patient department.

Data gathering had 2 parts, the first was collecting an antibiotics drugs list, and its subgroups, as used at Ramathibody Hospital. The second element of data gathering was interviewing nurses in order to understand the process of dispensing medicine to out-patients. The researcher's own experience and medical professionals encountered, helped create a framework for understanding the process of dispensing medicine to out-patients. The system was created with Microsoft Visual Basic 6.0 which interfaces between a database system and users, and the database system was created with Microsoft SQL Server 7.0.

This research developed a prototype of a medicine stock system for an out-patient department for any hospital, it is composed of two parts. The first part is a medicine stock database with correct data and details of medicines in stock. The second part is an application for use in an out-patient department. This application uses a graphic user interface format that is easy for users to understand. The testing of the medicine stock system showed it is able to successful support the whole process of dispensing medicine to out-patients.

This research showed that the application is suitable for use with the operations of an out-patient department in a hospital.

KEY WORDS : MEDICINE STOCK / STOCK SYSTEM / PROTOTYPE / MEDICINE / STOCK / OUT PATIENT

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การออกแบบและพัฒนาต้นแบบคลังยาแผนกผู้ป่วยนอก กรณีศึกษา แผนกผู้ป่วยนอกของโรงพยาบาลทั่วไป (DESIGN AND DEVELOPMENT OF A PROTOTYPE MEDICINE STOCK SYSTEM, A CASE STUDY OF AN OUT-PATIENT DEPARTMENT OF A GENERAL HOSPITAL)

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บทคัดย่อ

การวิจัยนี้มีจุดมุ่งหมายเพื่อการออกแบบและพัฒนาต้นแบบระบบคลังยาสำหรับแผนกผู้ป่วยนอก กรณีศึกษา โรงพยาบาลรามาธิบดี

การรวบรวมข้อมูลแบ่งออกเป็น 2 ส่วน 1.) รวบรวมข้อมูลของการกลุ่มยาปฏิชีวนะและกลุ่มยาย่อยของกลุ่มยานี้จากหนังสือบัญชียาของโรงพยาบาลรามาธิบดี 2.) รวบรวมข้อมูลจากการสัมภาษณ์พยาบาลเพื่อทำความเข้าใจกับขั้นตอนในการจ่ายยาให้กับผู้ป่วยนอก รวมทั้งประสบการณ์ของผู้วิจัยและขอคำแนะนำจากผู้เชี่ยวชาญทางด้านยาเพื่อให้เกิดความเข้าใจในขั้นตอนของการจ่ายยาให้ผู้ป่วยนอก ในส่วนของโปรแกรมระบบคลังยาสร้างด้วย Microsoft Visual Basic 6.0 ซึ่งใช้เป็นส่วนที่ติดต่อกันระหว่างระบบฐานข้อมูลและผู้ใช้งาน ส่วนระบบฐานข้อมูลสร้างด้วย Microsoft SQL Server 7.0 ซึ่งเป็นระบบจัดการฐานข้อมูลเชิงสัมพันธ์

การวิจัยนี้เป็นการพัฒนาโปรแกรมต้นแบบของระบบคลังยาสำหรับใช้ในแผนกผู้ป่วยนอกของโรงพยาบาลหนึ่งๆ ซึ่งประกอบด้วย 2 ส่วน คือ 1.) ส่วนฐานข้อมูลคลังยา ที่เก็บข้อมูลรายละเอียดต่างๆของยาภายในคลังยา และ 2.) ส่วนของโปรแกรมสำหรับใช้ในแผนกผู้ป่วยนอก โปรแกรมที่ได้พัฒนาขึ้นนี้ได้ใช้รูปแบบการติดต่อกับผู้ใช้ระบบแบบกราฟฟิค ทำให้ง่ายต่อความเข้าใจของผู้ใช้ การทดสอบระบบคลังยานี้จะสามารถพิสูจน์ถึงความสำเร็จในการสนับสนุนขั้นตอนของการจ่ายยาให้แก่ผู้ป่วยนอก

การวิจัยนี้แสดงถึงระบบคลังยาที่เหมาะสมสำหรับนำไปใช้ดำเนินงานในแผนกผู้ป่วยนอกของโรงพยาบาล

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CHAPTER 1
INTRODUCTION

1.1 Background and statement of problems

At present, Out-patients in the general hospital are always clouded. In the out-patient department concerning to dispensing medicine for out-patients is importance. Firstly, a doctor prescribes to out-patients. After a nurse or an out-patients who brings prescription to pharmacy department. The pharmacy department arranges medicine. And then the prescription is sent to cashier by pharmacist of the pharmacy department. Cashier department calculates all prices of medicine in order to collect money from out-patients. Finally, pharmacy department dispenses medicine to out-patients after out-patients paid to cashier department. The process of sending prescription to pharmacy department and cashier department take long time. Besides, doctor prescription and collecting money must be accurate. The steps of work are always create problem. Moreover the medicine in stock and the amount used are controversial. All of the problems are due to the step of work starting from prescription from doctor, out-patients bring the doctor prescription to the pharmacy department, the cashier collect the money and the out-patients pick up the medicine, all of these step cause error easily. In order to prevent these errors. We bring information technology to substitute the old fashion.

Thus, this research concerning about using computer and implement the relational database management system for sending item of medicine that doctor prescribes to pharmacy department. And then pharmacy department sends to cashier department after arrange medicine. The computer network can help shortening the process and avoid error and also prevent incorrect stock. The computer technology also alarm the pharmacist about the amount of medicine left in stock. Furthermore, this prototype medicine stock system can warn to medicine purchase when amount of medicine decrease before no enough for dispensing medicine to out-patientss including

giving information of medicine agency which ordered the last time. And it can warn expiratory date of medicine to pharmacy department. When medicine stock department input amount of medicine, this system can be increasing amount of its. Besides, this system can show queue of dispensation and queue of payment to out-patients can know own queue .

1.2 Objective

To design and development of a prototype medicine stock system, a case study of an out-patient department of a general hospital.

1.3 Scope of study

The scope of this study is limited to prototype antibiotics stock system for out-patient department of the general hospital. The design is as follows:

1.3.1 Design medicine stock system with Microsoft SQL Server 7.0. The list of medicine is received from drugs list of Ramathibody Hospital. Antibiotics is medicine group that is used for this system. The details of this medicine group covers only drugs list of Ramathibody Hospital. In this antibiotics group, it devided into10 subgroups. It consists of:

- Aminoglycosides
- Cephalosporins
- Chloramphenicols
- Macrolides
- Penicillins
- Quinolones
- Tetracyclines
- Antifungals
- Antibacterial Combinations
- Other Antibiotics

In each trade name of 10 subgroups consists of:

- Subgroup
- Trade name
- Generic name

- Unit Quantity
- Dosage Form
- Unit Price (Baht)
- Strength

Besides, the antibiotics stock system covers 5 departments in out-patient department of the general hospital as follows: doctor, pharmacy department, cashier department, purchase department, and medicine stock department that involve with this system. They are used as data in medicine stock system. The operations of 5 departments are the study from the general hospital.

1.3.2 The medicine stock system can be:

- To decrease the amount of medicine when each medicine arranged to out-patients.
- To increase the amount of medicine when medicine stock department bring medicine into system.
- To warn the purchasing department when should purchase it.
- To warn the expiry date of medicine to pharmacy department.

1.3.3 Design of application interface with Microsoft Visual Basic 6.0.

1.3.3.1 Five departments of the general hospital are designed of user interface for access antibiotics stock system. This research in each department covers the operation as follows:

- Doctor involves to prescription.
- Pharmacy department involves to arrangement and dispensing medicine. Pharmacist can change item of medicine that doctor order.
- Cashier department involves to print receipt and to receive out-patients's payment.
- Purchase department involves the purchasing of medicine. It receives details of medicine agency that recently purchase.
- Stock medicine department involves the bringing of medicine into medicine stock system.

1.3.3.2 Design checking privilege of access of each user.

1.3.3.3 Design access of administrator.

1.3.3.4 Design queue of payment that shows 15 ranks of queue of out-patientss that wait for payment.

1.3.3.5 Design queue of dispensation that shows 15 ranks of queue of out-patientss that wait for dispensation.

1.4 Step of study

The steps of study in this research are as follows.

1.4.1 Data Collection

1.4.2 System Analysis

1.4.3 System Design

1.4.4 Application Development

1.4.5 Testing and Evaluation

1.4.6 Conclusion and Recommendation

1.4.7 Documentation

1.5 Expected Result

1.5.1 Obtain prototype of medicine stock system for out-patient department of any hospital (Antibiotics only).

CHAPTER 2
LITERATURE REVIEW

This chapter describes about the literature review, which relate design and develop the prototype of medicine stock system for out patient department.

2.1 Name of drug

One of the more confusing aspects of drugs is understanding their names because most drugs have at least three names, and it is not always apparent which name is being used at any given time,[1]

2.1.1 Chemical Name

Chemical Name is in formal chemical jargon, and a chemist can usually tell by looking at the name what the molecule of the drug looks like.

2.1.2 Generic Name

Drug chemical name is too clumsy and so a new. Thus, shorter name is made up for the drug, the generic name or nonproprietary name. The generic name bears some resemblance to the chemical name.

2.1.3 Trade Name

When a drug company invents and develops a new drug, it can patent the drug for a number of years so that no other company can sell it. The drug company does not sell the drug under its generic name. Instead, it makes up a new name called the trade name or proprietary name. There can be many different trade names for the same drug.

2.2 Internet and Intranet

The Internet, in its broadcast sense, can be defined as a collection or interconnection of many different networks of computer hosts, clients, and severs that collectively provide and use information and connection services. This “network of

computer network” now includes a community that literally spans the globe and counts among its members nearly every country in the world.

Computers with access to the Internet come in all sorts of makes and models and run a variety of operating systems and applications. Strictly speaking, computers connected to the Internet are those that use Transport Control Protocol/Internet Protocol (TCP/IP) suite, which is a common set of rules that allow a variety of systems to communicate. Computers on non-TCP/IP networks, however, can access Internet through gateways that perform the necessary protocol translations and allow appropriate communications.

Intranet [2] are applications that are internal to organizations. These application use Internet technologies such as Web servers, Web browser, standard TCP/IP networks, and development tools such as HTML, ActiveX control, client-side scripting. Like their Internet counterpart applications, Intranet applications provide information and services to a number of users - in this case, the employee of the organization.

It’s important to note that an Intranet is not defined by any physical boundaries or geographical constraints. In fact, Intranets are global in many cases. The Intranet boundaries are defined by who has access to the information. This might be all employees of a company or only those members of a development team within a company. It all depends on the application and the requirements it fulfills.

Intranet has experienced an explosion in growth in recent months because they allow for fundamental changes in the way business processes are conducted. Intranet applications allow for more efficient, more effective, more accurate communications and dissemination of information, all of which contribute to greater productivity of employees.

2.3 Computer Network

Computer networks come in many different shapes and sizes. Over the years, the networking industry has coined terms like "LAN" and "WAN" attempting to define sensible categories for the major types of network designs. The precise meaning of this terminology remains lost on the average person, however.

2.3.1 Area Networks

For historical reasons, the industry refers to nearly every type of network as an "area network." The most commonly-discussed categories of computer networks include the following:

2.3.1.1 Local Area Network (LAN)

2.3.1.2 Wide Area Network (WAN)

2.3.1.3 Metropolitan Area Network (MAN)

LANs and WANs were the original flavors of network design. The concept of "area" made good sense at this time, because a key distinction between a LAN and a WAN involves the physical distance that the network spans. A third category, the MAN, also fit into this scheme as it too is centered on a distance-based concept. As technology improved, new types of networks appeared on the scene. These, too, became known as various types of "area networks" for consistency's sake, although distance no longer proved a useful differentiator.

2.3.1.1 LAN Basics

A LAN connects network devices over a relatively short distance. A networked office building, school, or home usually contains a single LAN, though sometimes one building will contain a few small LANs, and occasionally a LAN will span a group of nearby buildings. In IP networking, one can conceive of a LAN as a single IP subnet (though this is not necessarily true in practice).

Besides operating in a limited space, LANs include several other distinctive features. LANs are typically owned, controlled, and managed by a single person or organization. They also use certain specific connectivity technologies, primarily Ethernet and Token Ring.

2.3.1.2 WAN Basics

As the term implies, a wide-area network spans a large physical distance. A WAN like the Internet spans most of the world!

A WAN is a geographically-dispersed collection of LANs. A network device called a router connects LANs to a WAN. In IP networking, the router maintains both a LAN address and a WAN address.

WANs differ from LANs in several important ways. Like the Internet, most WANs are not owned by any one organization but rather exist under collective

or distributed ownership and management. WANs use technology like ATM, Frame Relay and X.25 for connectivity.

2.3.2 Network Topology

In networking, the term topology refers to the layout of connected devices on a network. This article introduces the standard topologies of computer networking.

One can think of a topology as a network's "shape." This shape does not necessarily correspond to the actual physical layout of the devices on the network. For example, the computers on a home LAN may be arranged in a circle, but it would be highly unlikely to find an actual ring topology there.

Network topologies are categorized into the following basic types:

- bus
- ring
- star
- tree
- mesh

More complex networks can be built as hybrids of two or more of the above basic topologies.

2.3.2.1 Bus

Bus networks (not to be confused with the system bus of a computer) use a common backbone to connect all devices. A single cable, the backbone functions as a shared communication medium, that devices attach or tap into with an interface connector. A device wanting to communicate with another device on the network sends a broadcast message onto the wire that all other devices see, but only the intended recipient actually accepts and processes the message.

Ethernet bus topologies are relatively easy to install and don't require much cabling compared to the alternatives. 10Base-2 and 10Base-5 both were popular Ethernet cabling options years ago.

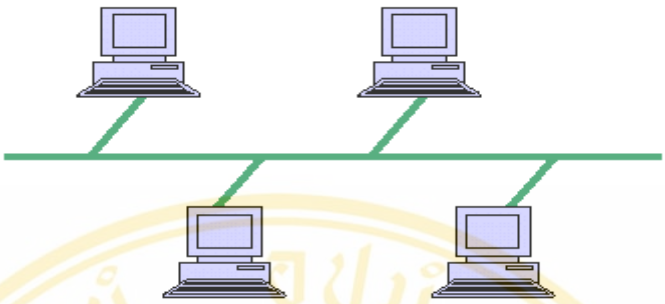


Figure 2.1 Bus Topology

However, bus networks work best with a limited number of devices. If more than a few dozen computers are added to a bus, performance problems will likely result. In addition, if the backbone cable fails, the entire network effectively becomes unusable.

2.3.2.2 Ring

In a ring network, every device has exactly two neighbors for communication purposes. All messages travel through a ring in the same direction (effectively either "clockwise" or "counterclockwise"). A failure in any cable or device breaks the loop and can take down the entire network.

To implement a ring network, one typically uses FDDI, SONET, or Token Ring technology. Rings are found in some office buildings or school campuses.

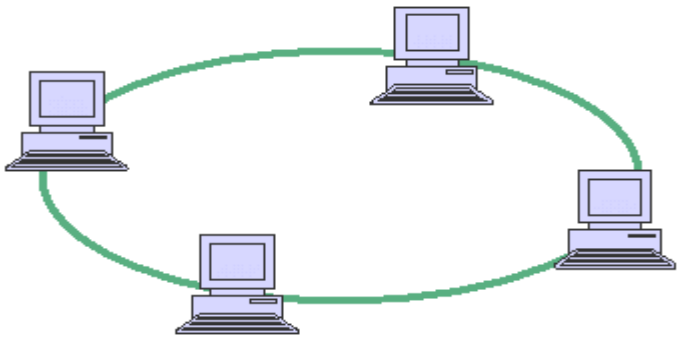


Figure 2.2 Ring Topology

2.3.2.3 Star

Many home networks use the star topology. A star network features a central connection point called a "hub" that may be an actual hub or a switch. Devices typically connect to the hub with Unshielded Twisted Pair (UTP) Ethernet.

When compared to the bus topology, a star network generally requires more cable, but a failure in any star network cable will only take down one computer's network access and not the entire LAN. (If the hub fails, however, the entire network also fails.

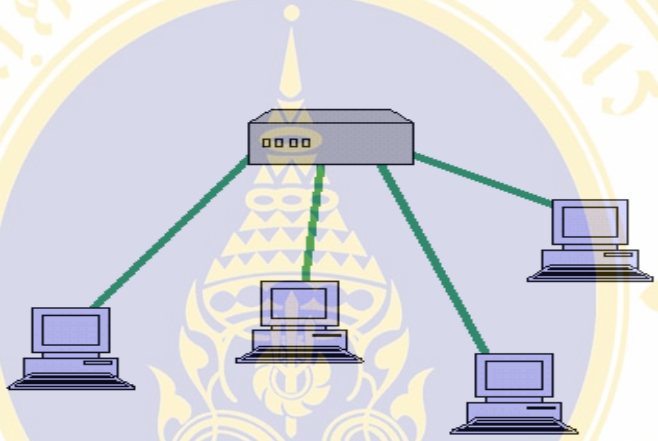


Figure 2.3 Star topology

2.4 Client – Server Architecture

In the early 1980, the first system based on the relational model appear on the market, bringing define advantage over their predecessors. Today a large number of relational products is available architecture on mainframe computer, minicomputer, microcomputer, LAN and client/server. The database on the each architecture is different to work, Townsend JJ [3] has compared the database operation of each architecture follow as the table 2.1.

Table 2.1 Completing Database Architectures

Component	Workstation	Server/Mainframe	Network
Microcomputer	Store data, Processes queries, Handles user interface	N/A	N/A
LAN	Processes queries, Handles user interface	N/A	Stores data (field server), transmits files PC for processing
Mainframe	With emulation software, maybe used as dumb terminal	Store data, Processes queries, Handles user interface(dumb terminals)	N/A
Client/Server	Handles users interface, submits SQL queries to database server	Stores data, Process queries received from workstation	For works to database server and answers to workstation

The most widely touted technology for relational database is client/server architecture. A client/server system is a distributed system which consists of a collection of sites, connected together via communications network, in which some sites are server site and other are client, the server, and the network.[4]

2.4.1 The server (also called back-end) computer stores the data, process the clients' requests for data, and control data access and security. The server can be microcomputer, minicomputer or mainframe computer and can run several operating system. Database server software, such as Microsoft SQL server , Oracle or DB2, manages the database and process requests for information from client.

2.4.2 The client (also called front-end) is the interface to the user. The client often is a microcomputer, The client is the various application that runs on the DBMS. Application can be divided into several reasonably as follows:

2.4.2.1 User - written application. These are basically regular application programs, written either in a conventional programming language such as C, Visual Basic, or Delphi.[5]

2.4.2.2 Vendor - provided application (often called tools). The overall purpose of such tools is to assist in the process of creating and executing other applications. All the general DBMS vendors have tool creating front-end application for DBMS server themselves.[5]

2.4.2.3 The network provides a communication channel between the clients and the server, The network, which consists of hardware, transmits data among all workstations and servers.

Khoshofian [6] has the opinion that a major requirement of a corporation's database system today is to provide uses with access to data from one or more remote sites. This need is addressed by the client / server computing environment, which is illustrated in figure 2.4 The responsibility of data representation and access is divided between the client and the server.

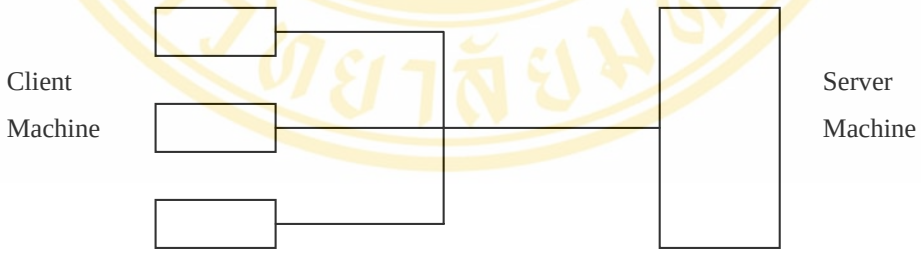


Figure 2.4 The client / server computing environment.

Step in client-server architecture protocol, which is illustrated in figure 2.5, are:

- User queries database.
- Client machine presents query to the server machine.
- Database system

- accepts query
- complies query
- selects best optimization strategies

- Database management system
  - collects the result of query
  - transfers to client machine

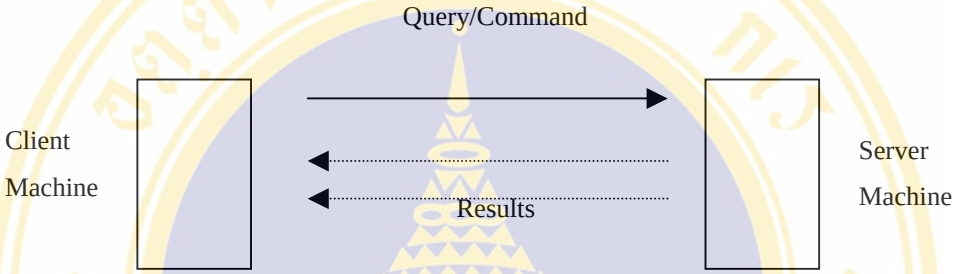


Figure 2.5 Client –server architecture protocol.

Most database systems provide an application interface (API), which is used by client application to access database stored on a remote server. The typical protocol followed by a client machine and database server providing the API is summarized in figure 2.6.

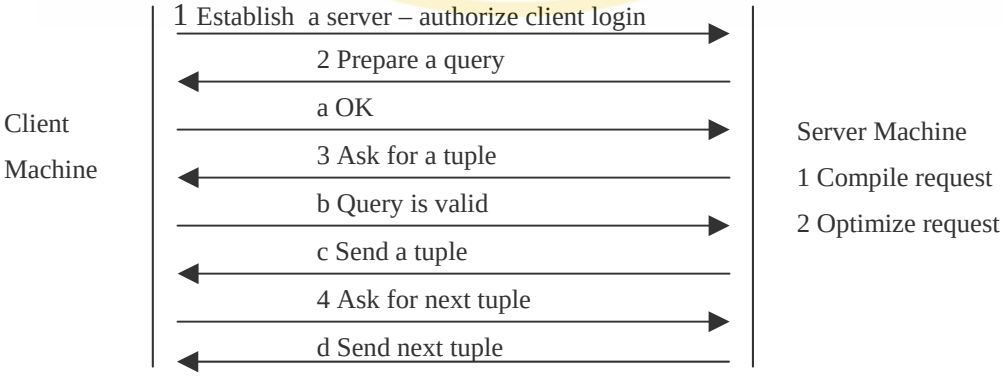


Figure 2.6 The typical protocol followed by a client machine and database server providing the API.

2.5 Database

2.5.1 Concept of Database

A database is an integrated collection of data stored in different types of records, and in a way that makes them accessible for multiple applications. The interrelation of the records derives from the relationships in the data, not from their physical storage location. Records for different entities are typically stored in a database (whereas files store records for a single entity). In a university database, for example, records for students, courses, and faculty are interrelated in the same database. The structure of the relationship in most database follows one of three logical database models: Hierarchical, network, and relational. Hierarchical and network models are still being used today, but relational models are the most popular. A brief outline of database models follow:

2.5.1.1 Hierarchical or Tree Model:

A Hierarchical model is organized in top-down or inverted tree-like structure. An organization chart, for example, shows the layers of executives, middle managers, and operational personnel. The hierarchical model is shown with the highest level of tree known as the root. The nodes of the tree represent entities. A hierarchical model permits two type of relationship:

- One-to-one: An entity at one level is related to one entity at the next level.
- One-to-many: An entity at one level is related to zero, one, or more entities at the next level

The design of a hierarchical database will affect the accessibility of the data. In the store example, Items are always related to an order. In addition, orders are always related to a specific customer.

It is very efficient to have the orders for certain customer or the items in a particular order. Anomalous (undesirable) side effects occur under certain database designs. Hierarchical database involve anomalous with respect to the following:

- Insert of records: A dependent record cannot be added to the database without a parent. For example, Items cannot be added without their inclusion in an order.

- Deletion of records: Deleting a parent from the database also deletes all its descendant. For example, deleting a customer also deletes outstanding orders.

2.5.1.2 Network Model:

A network model is similar to the hierarchical model, except that an entity can have more than one parent. In the college example, a relationship can be shown between instructors and students. This capability introduces the use of an additional type of relationship in the data:

- Many-to-many: An entity can be related to zero, one, or more than one entity at another level

In network database, as in hierarchical database, the relations between entities must be established at the time the data model is established and the database created. The system analyst must conform to these details when developing applications that enter or retrieve data during processing.

The hierarchical and network database are conceptually simple and appear uncomplicated when first examined. In a large database environment, however, they can rapidly evolve into a complicated web of interrelationships that are difficult to manage as the database evolves with use.

2.5.1.3 Relational Model:

The relational data model, developed in 1970 by E.F. Codd, is based on a relation, a two-dimensional table. Row in the table represent the records; and columns show the attributes of the entity Relational databases use on a model to show how data are logical related.

The order of the data in the table is not significant and no order is implied when records are included in the relation. Similarly, the physical details of storage are not of concern to the analyst. Relational tables show logical, not physical, relationships.

When a request for information is made, the system produces a table containing the information. In the laundry example, if a manager wishes to determine who use napkins, the system will produce a table containing the name of all users of napkins.

The relational database model is by far the most widely used. It is easier to control, more flexible, and more intuitive than the others because it organizes data in

table. The ability to link relational tables also allows user to relate data in new ways without having to redefine complex relationships. Because of its many advantages, many companies use the relational model for large corporate databases, such as marketing and accounting. The relational model can be used with personal computers and mainframe systems.

2.5.2 Normalization

Normalization is a process of simplifying the relationship between data elements in a record. Through Normalization a collection of data in a record structure is replaced by successive record structures that are simpler and more predictable and therefor more manageable. Normalization is carried out for four reasons:

- To structure the data so that any pertinent relationship between entities can be represented
- To permit simple retrieval of data in response to query and report requests
- To simplify the maintenance of the data through updates, insertions, and deletions
- To reduce the need to restructure or reorganize data when new application requirements arise

The Steps in Normalization

First Normal Form (1NF): A relation is in 1NF if the values in the relation are atomic for every attribute in the relation. By this we mean, simply, that no attribute value can be set of values or, as it is sometimes expressed, a “repeating group”

Second Normal Form (2NF): A relation is in 2NF if no nonkey attribute is in functionally dependent on just a part of the key. The process of decomposing the non-2NF relation into 2NF relations follows a few simple steps: (1) Create a new relation by using the attributes from the offending FD as the attributes in the new relation. (2) The attribute on the right side of the FD is the eliminated form the original relation. (3) If more than one FD prevents the relation from 2NF, repeat steps 1 and 2 for each FD.

Third Normal Form (3NF): A relation is in 3NF if for every functional dependency (FD): X -> Y, X is a key. The 3NF is often called Boydd Codd Normal Form (BCNF).

Fourth Normal Form (4NF): A relation is in 4NF if it is 3NF and has no multivalued dependencies (MVD). Since the problem of multivalued independencies arise form multivalued attributes, we can reach a solution by placing all multivalued attributes in relations by themselves, together with the key to which the attribute values apply.

Fifth Normal Form (5NF): Functional dependency and multivalued dependency constraint result in the need for Second, Third, and Fourth Normal Form. The 5NF eliminates anomalies that results from a special type of constraint called join dependencies.

2.5.3 Relational Model Terms [7]

Key	A minimal set of attributes that uniquely identifies each row in a relation.
Primary Key	A single column or the combination of multiples columns that uniquely identifies the row in the table.
Foreign Key	A single column or multiple columns that relate to the primary key in another table.
Table (relation)	It is used to stored data. It is organized in a row (tuple) and / column (attribute) manner that data can be manipulated by DBMS.
Constraint	A rule that restricts the values in a database.
Atomic value	Atomic values
Functional Dependency (FD)	The value of an attribute in a tuple determines the value of another attribute in the tuple.
Determinant	The attribute(s) on the left side of a functional dependency; determine(s) the value of other attributes in the tuple.
Multivalued Dependencies(MVD)	A constraint that guarantees the independence of multi valued attributes.

2.5.4 The Database Management System (DBMS)

The database management system [8] is a program for binding the file structures that store data and the data structure that represent the data needs of users. DBMS consist of group of programs that can be used as an interface between a database and the user or the database and application programs. Typically, this software acts as a buffer between the application programs and the database itself.

2.6 Data Independence

Data independence is the capacity to change the schema at one level of a database system without having to change the schema at the next higher level. Data independence can be defined as the immunity of application to change in storage structure and access technique. There are two types of data independence.[9]

2.6.1 Logical data independence is the capacity to change the conceptual schema without having to change external schemas or application programs. It is to be changed the conceptual schemas to expand the database, or to reduce the database. In the latter case, external schemas that refer only to the remaining data should not be affected.

2.6.2 Physical data independence is the capacity to change the internal schema without having to change the conceptual(or external)schemas. Changes to the internal schema may be needed because some physical files had to be reorganized to improve the performance of retrieval or update. Physical data independence refers to the insulation of an application from the physical storage structures only.

2.7 The Database Producer Sequence

The decision to collect the information has to be followed by decisions on what the scope or coverage and the content of the record should be. The steps at the database-creation end are:[10]

2.7.1 Decision to create a database.

2.7.2 Decision on scope of the collection: about what entities should information be collected.

2.7.3 Decision on design of the individual records: what information is wanted about an entity.

2.7.4 Selection of the actual items for inclusion.

2.7.5 Creation of the content of individual records.

2.7.6 Data entry.

2.7.7 Quality control. It is concerned with the correctness and consistency of entries.

2.8 The Data Dictionary

The data dictionary is a tool that can be used in the effective management of the data source. The data dictionary will contain names, descriptions, and definitions of the organization's data resource. It can provide managers and other users with concise definitions of entities and data items that are important to the organization. It can indicate where data is used, what area uses it, how it is used, and other dependencies on that data.[11]

2.9 The Advantages of Database

The advantages of a database system over traditional, paper-based methods of record-keeping are the following:[5]

- Compactness: No need for possible voluminous paper files.
- Speed: The machine can retrieve and change data for faster than a human can.
- Less drudgery: Much of the sheer tedium of maintaining files by hand is eliminated. Mechanical tasks are always better done by machines.
- Currency: Accurate, up-to-date information is available on demand at any time.

2.10 Benefit of the Database Approach [5]

2.10.1 Redundancy can be reduced.

2.10.2 Inconsistency can be avoided.

2.10.3 The data can be shared.

2.10.4 Standards can be enforced

2.10.5 Security restrictions can be applied.

2.10.6 Integrity can be maintained.

2.10.7 Conflicting requirements can be balanced.

2.10.8 The provision of data independence.

2.11 Database System Security

Database security is concerned with the ability of the system to enforce a security policy governing the disclosure, modification or destruction of information. The principles related to database security have been widely accepted today are the following[12]

2.11.1 The database system security considerations must take into account all system S/W and H/W that touches information flowing into, and out of, the database.

2.11.2 Data integrity is a key requirement. The database system must preserve the integrity of the data stored in it.

2.11.3 Data should be available when needed.

2.11.4 Audit should be detailed enough to be useful and sufficient enough so as not to severely burden system performance.

2.11.5 The aim should be at providing adequate level of secrecy(prevent disclosure) and yet preserving integrity by using appropriate concurrence and integrity controls.

2.11.6 The prototypes should be of general purpose, commercial quality and, according to most proposers, relational systems.

2.12 Microsoft SQL Server

Khoshofian has described that SQL Server is a relational database system supporting client/server architecture through SQL language and programming interface extension.

Banthit Jamornphut has described that Microsoft SQL Server is a relational database system product of Microsoft Corporation. It supports ‘ Two-phase commit/Tight consistency’ to keep situation of data between servers in the system by using ‘commit’ for transaction of data (which is sent and received between servers) must be recorded in database of both servers correctly and concurrency, or ‘roll back’ back to the same situation.

SQL Server is composed of the following components:

- ISQL/W (Interactive SQL): is used for writing statement transact-SQL. It is able to be run on both server and client.
- SQL Enterprise Manager: is used to create devices, objects, configuration, grant users.
- ODBC (Open database connectivity): is used to replicate data to other database system, for example, ORACLE, Access.
- MS DTC (MS distributed transaction coordinator): is used to manage routine of transact-SQL in updating data of servers within a same transaction.

2.13 ADO (Active X Data Object)

ADO is one of data access interfaces in Visual Basic. The ADO object model defines a collection of programmable objects that support the Component Object Model (COM) and OLE Automation to leverage the powerful partner technology called OLE DB. The OLE DB is COM-based interface between data provider and client applications. Data provider can be anything from relation databases to file system. Microsoft knew it needed to create an easy-to-use object layer on top of OLE DB, The OLE DB Model shown in Figure 2.7. Thus ActiveX Data Objects were born. The ADO object model - when compared to other data access objects such as RDO or ADO - is flatter (has fewer objects) and simpler to use. The ADO object model is shown in Figure 2.7.

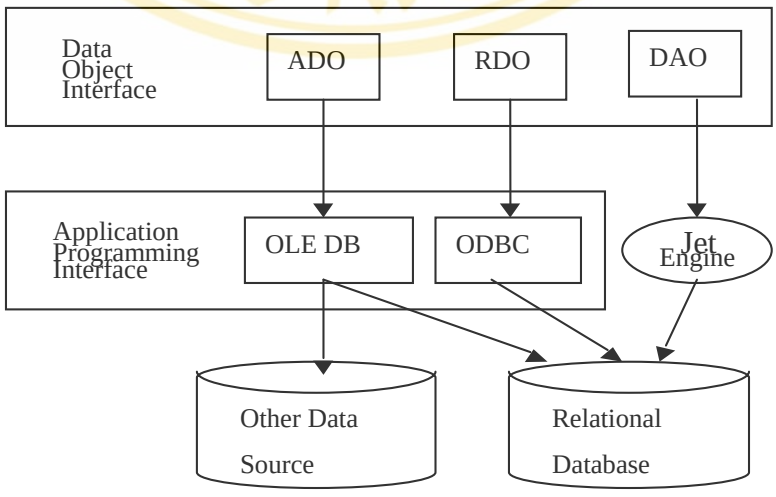


Figure 2.7 The OLE DB Model.

There are seven objects in the ADO object model, as described in the following lists.

- Command object Maintains information about the command, such as query string, parameter definitions, and so on. We can execute a command string on a Connection object of a query string as part of opening a recordset object, without defining a Command object. The Command object is useful to define query parameters or execute a stored procedure that returns output parameters. The Command object supports a number of properties to describe the type and purpose of the query and help ADO optimize the operation.
- Connection object Maintains connection information such as cursor type, connection string, query time-out, connection time-out, and default database.
- Error object Contains extended error information about error conditions raised by the data provider. Because a single statement can generate two or more errors, the Error collections can contain more than one Error object at a time.
- Field object Contains information about a single column of data within a recordset. The recordset object uses the Fields collection to contain all of its Field objects. This Field information includes data type, precision, and numeric scale.
- Parameter object A single parameter associated with a Command. The Command object uses the Parameters collection to contain all of its Parameter objects. ADO Parameter objects can be created automatically by sending queries to the database. However, we can also build this collection programmatically to improve performance at run time.
- Property object A provider-defined characteristic of an ADO object. ADO objects have two types of properties: built-in and dynamic. Built-in properties are those properties implemented in ADO and available to any new ADO objects. Dynamic properties are defined by the underlying data provider and appear in the Properties collection for the appropriate ADO object. For example, a property may indicate if a recordset object supports transactions or updating. This is one of the greatest features of ADO, in that it lets the ADO service provider present special interfaces.
- Recordset object A set of rows returned from a query, including a cursor into those rows. We can open a recordset object (that is, execute a query)

without explicitly opening a Connection object. However, if we do first create a Connection object, We can open multiple recordset objects on the same connection. Objects in ADO shown in Figure 2.8.

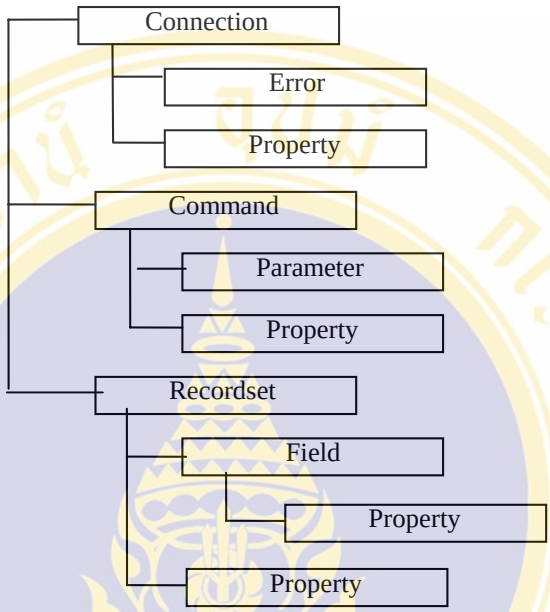


Figure 2.8 ADO Object Model.

2.14 Microsoft Visual Basic

Visual Basic is an instructional system for programming customized business applications. Its real purpose is to generate unique problem-solving applications. Its purpose in the office computing environment is for the production of small application specifically adapted for well-defined tasks. Because of Visual Basic's design, clicking a command button activates an event procedure that performs the function of that specific button. It uses symbols to represent or model situations in which the symbol and the situation have no direct link to one another.[13]

2.15 Microsoft Windows NT

Banthit Jamornphut has described that Microsoft Windows NT is a network operating system product of Microsoft Corporation. The architecture of Windows NT is composed of client/server architecture and layer architecture, which is divided into

2 modes. Annop Kantikul, Porapat Suthidara, Sajja Jaradrungraweeworn has described these modes in details:

1. Kernal mode (NT Executive)

Is the mode of system working. It is divided into 4 parts:

a. System service: is composed of 5 components.

- Security reference monitor (SRM): for managing security.
- Object manager (OM): for creating and deleting objects: files, devices, share memory.
- Local procedure call (LPC): for managing communication between application (clients)and protected system(Server).
- Process manger (PM): for managing process (application in execution) and threads(sub-components of application) to run into processor for SMP(Symmetric multiple processing).
- Virtual memory manager (VMM); for protecting memory one process from the other and managing requirements for memory in parts of excess of RAM of the system by swapping to hard disk.

b. Input / Output (I/O)manager: manages file system, network equipment. It is composed of 4 components.

- File system: for supporting operation with file system
- Cache manager: for managing cache : improve access to disk, CD-ROM efficiently.
- Network driver: for managing input/output of network.
- Device drivers: is composed of 32- bit code used to manage hardware interface between hardware and other components call for using hardware.

c. Kernel: is a lower component, used for managing interrupt, exception handling, execution of threads, and processing.

d. Hardware abstraction layer: is a code between processor and kernel. The function is changing code from kernel to order processors to run operations, for example, manage input/output, manage stack, control interrupt.

2 . User mode (Protected subsystems)

Is an interface between application program or subsystems (DOS, Windows 16 bit & 32 bit, OS/2, POSIX/UNIX) and kernel mode. Each subsystem has

application program interface. Windows NT had environment subsystem for applications in different environments.

CHAPTER 3
MATERIALS AND METHODS

This chapter describes about the research tools, the research methodology and procedures prototype of medicine stock system for out-patient department of the general hospital.

3.1 Research Tools

3.1.1 Software:

3.1.1.1 Operating System : Windows XP

3.1.1.2 Developing Tool : Visual Basic 6.0

3.1.1.3 Database : MS SQL Server 7.0

3.2 Research Methodology and Procedure

For design and develop the prototype of medicine stock system for out-patient department of the general hospital has seven steps referred to the systematic approach. System development life cycle (SDLC) is a phased approach to analysis and design, which hold that systems are the best developed through the use of a specific cycle of analyst and users activities. SDLC is illustrated the developing steps in Figure 3.1.

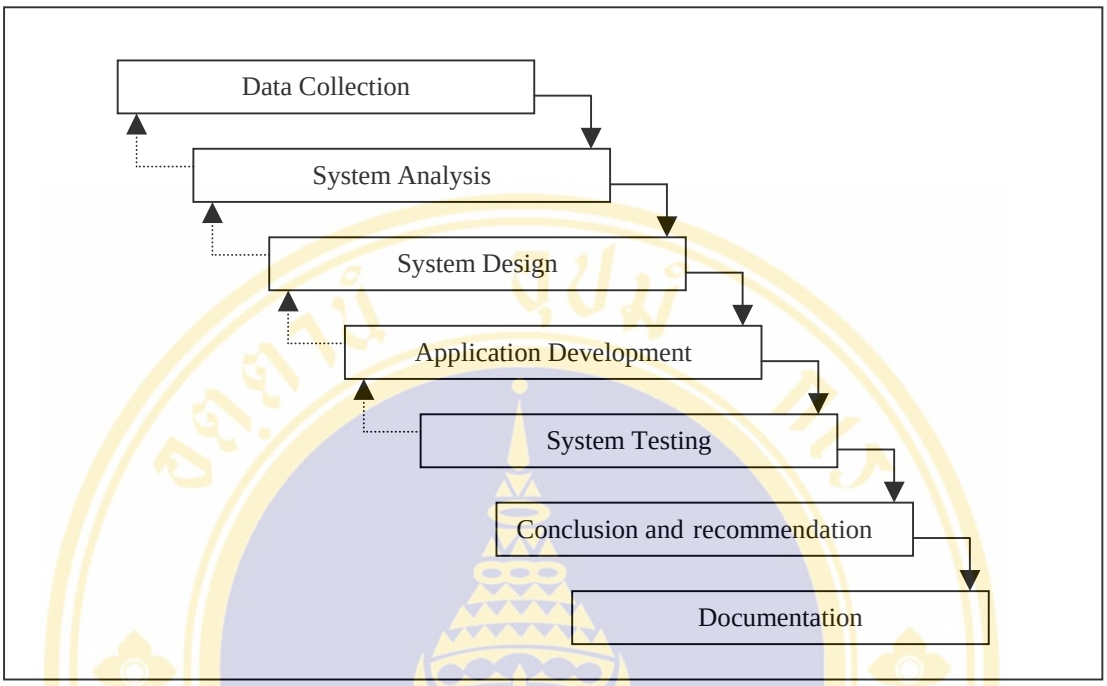


Figure 3.1 Research Methodology and Procedure.

3.2.1 Data Collection

Data concerns with medicine stock system to be collected. The source of data is gathered from two sources as follows:

3.2.1.1 Data of medicine is collected from drugs list of Ramathibody Hospital.

Data from this source is brought into medicine database system. This research is prototype of antibiotics stock system. So, data about antibiotics group is sampling to be collected into the database.

3.2.1.2 Data of processes in dispensing medicine to out-patients is collected from inquiry with expert and researcher's experience including character of operations of 5 departments can see from the general hospital involving with medicine stock system.

The departments concern with medicine stock system as follows:

- Doctor: data about details in prescription.

- Pharmacy department: data about storing medicine.
- Cashier department: data about out-patients ’s receipt.
- Purchase department: data about purchasing medicine.
- Medicine stock: data about receiving and checking medicine.

Data of each department are used in create user interface its.

3.2.2 System Analysis

3.2.2.1 Requirement investigation: This step is to review existent system. Requirement investigation relies on the fact-finding technique and all data are collected during the fact-finding investigation to be analyzed to determine requirement specification.

3.2.2.2 Identity the available resources: software and environment of operations in general hospital relate to medicine stock system.

3.2.3 System Design

The tools and techniques are used for design medicine stock system compose of:

3.2.3.1 Data Flow Diagram (DFD) represents input, process, and output of medicine stock system.

3.2.3.2 Data Dictionary represents a list of all the data items used in the medicine stock system.

3.2.3.3 Entity Relationship Diagram (ERD) represents the conceptual design of medicine stock system. It consists of entity and relationship.

Database design bases on the relational model of the data contained in the table. Thus, database design must be designed in a manner of table of data, primary key, secondary key and relationship.

3.2.4 Application Development

Develop the application under PC, Windows 98 Operating system, Visual Basic 6.0 and Microsoft SQL Server 7.0 database. This phase is complete when all code is written, compiles error-free.

3.2.5 System Testing

The system is tested for debugging errors of individual module, and is tested of the whole system.

3.2.6 Conclusion and recommendation

Research conclusion and recommendation for further study.

3.2.7 Documentation

Create thesis document and system manual.

CHAPTER 4
RESULTS

The result of this study will be described as follows: data flow diagram and process specification, data dictionary, entity relationship diagram, user interface, system security, program testing.

4.1 User and functional classification

According to the information collected from operations about medicine stock. Users can be categories 5 departments in out-patients department of the general hospital for using medicine stock system. Besides, prototype of medicine stock system has administrator who can access operations in every departments of out-patients department of the general hospital. Users of this system have functions as follows:

4.1.1 Doctors

They handle the functions in diagnosis of out-patients and will be responsible in medicine order including manage out-patients. The job include:

- Change own login password.
- View details about all medicine in medicine stock.
- View data of all users in medicine stock system.
- View , add, update out-patients ’s data.
- Add medicine order to out-patients.

4.1.2 Pharmacy department

They handle the functions in arrange and dispense medicine to out-patients including change medicine from doctor order. Besides, they will be responsible in manage medicine in medicine stock system. The job include:

- Change own login password.
- View all users ’s data in medicine stock system.
- View detail about medicine in medicine stock system.

- View out-patients's information.
- Update information of medicine in medicine stock
- Add medicine in medicine stock
- Add group and subgroup in medicine stock
- Add subgroup in exist group in medicine stock.
- Delete expiry medicine in medicine stock when leaving it.
- Add ,update delete medicine agency.

4.1.3 Cashier department

They handle the functions in print out the receipt to out-patients and receive payment from them. The job include:

- Change own login password.
- View all users 's information in medicine stock system.

4.1.4 Purchaser department

They handle the functions in medicine purchasing when it is warned from medicine stock system and print purchase order (PO). The job include:

- Change own login password.
- View information of all users in medicine stock system.
- View details of medicine purchasing in the past.
- Add medicine purchasing in purchase order.
- Add, update, delete medicine agency.

4.1.5 Stocker department

They handle the functions in medicine keeping into medicine stock system. The job include:

- Change own login password.
- View information of all users in medicine stock system.
- View details of medicine purchasing in the past.
- Add, update, delete medicine agency.

4.1.6 System administrator

They can access operations of all the functions and all departments. They handle add users of medicine stock system.

4.2 Data Flow Diagram and Process Specification

Data flow diagram is a graphical technique that depicts data flow and the transforms that are applied as data move from input to output. The data flow diagram may be used to represent a system or software at any level of abstraction. In fact, DFD may be partitioned into levels that represent increasing data flow and functional detail.

Process Specification (PSPEC) is used to specify the processing details implied by a bubble within a DFD. The PSPEC describes the input to a function; the algorithm that is applied to the input and output that is produced. In addition, indicated restrictions and limitations imposed on the process, and design constraints that may influence the way in which the process will be implemented.

Data flow diagram of medicine stock system consists of 2 levels. In this sections the details of data flow diagram will be described as follows:

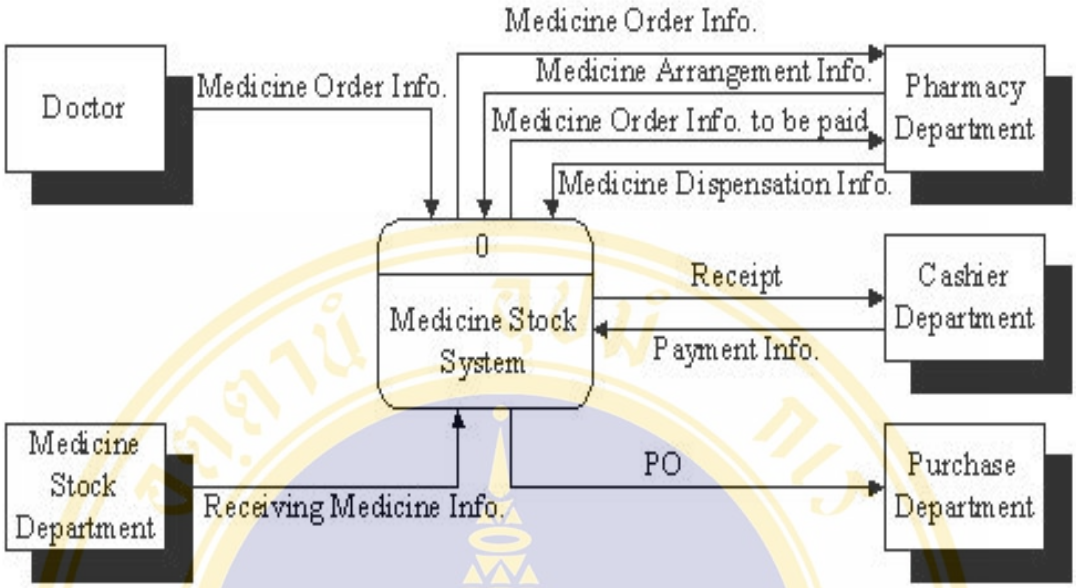


Figure 4.1 The Context Data Flow Diagram of Medicine Stock System.

The context level of medicine stock system composes of 5 entities as follows:

- Doctor who order medicine to out-patients. Medicine order information is send into medicine stock system for pharmacy department.
- Pharmacy department who receive medicine order information from medicine stock system for medicine arrangement and dispensation information from this system for medicine dispensation to out-patients. Besides, they send medicine arrangement information into system for cashier department.
- Cashier department who receive receipt from system for collecting money from out-patients. Besides, They send out-patients ’s payment information into system for pharmacy department.
- Purchase department who receive PO from system for medicine purchase.
- Medicine stock department who send receiving medicine information into system for increasing medicine in medicine stock.

PSPEC : 0 Medicine Stock System		
Input	:	Medicine Order, Medicine Arrangement, Payment and Receiving Medicine Information
Process	:	'Medicine Stock System' process is the main process, which control 'Medicine Order' process, 'Medicine Arrangement' process, 'Receipt' process, 'Medicine Dispensation' process, 'Medicine Purchase' process and 'Medicine Checking' process.
Output	:	Medicine Order Information, Medicine Dispensation Information, Receipt, PO

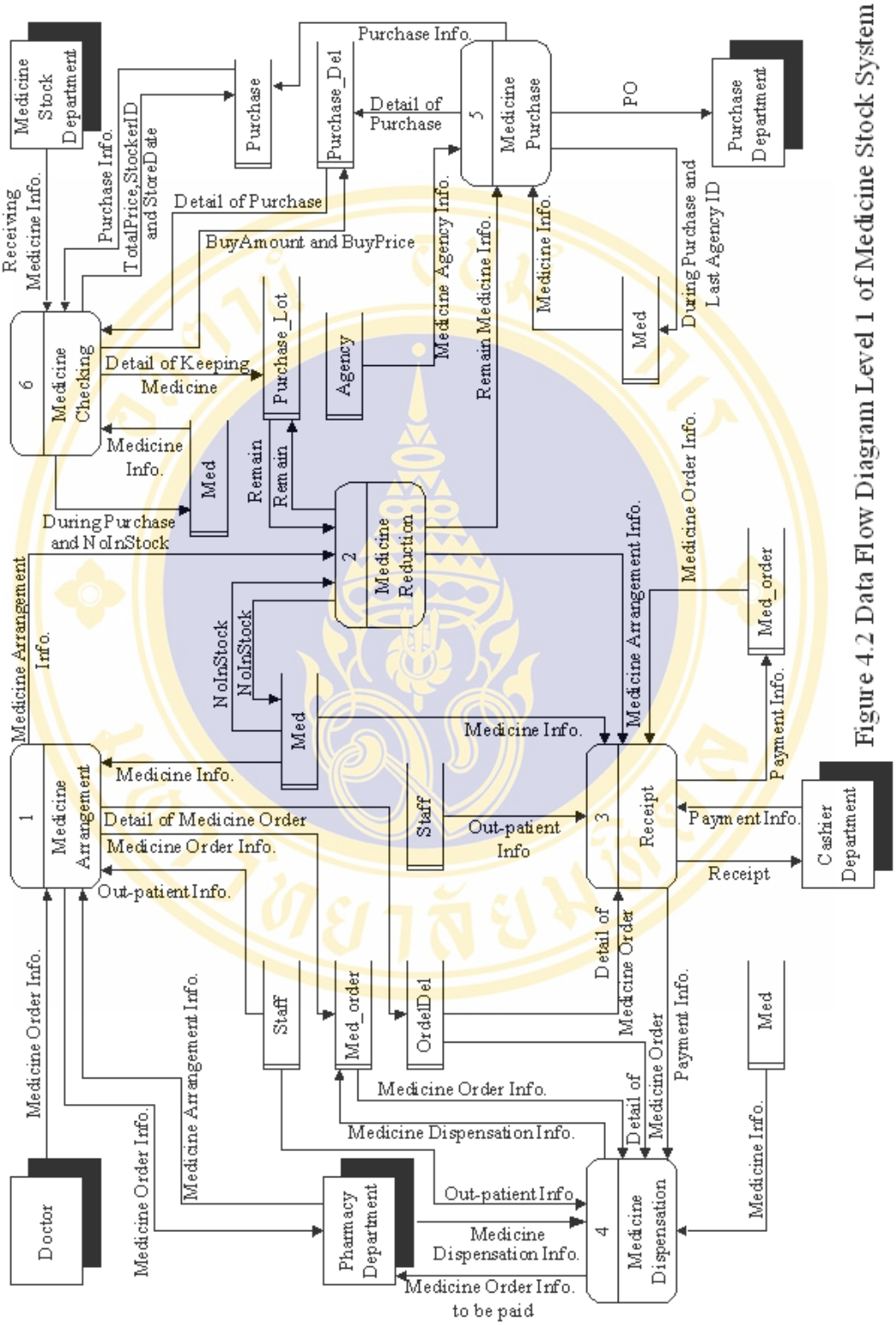


Figure 4.2 Data Flow Diagram Level 1 of Medicine Stock System

PSPEC : 1 Medicine Arrangement		
Input	:	Medicine Order, Medicine Arrangement, Medicine Information and Out-patients
Process	:	'Medicine Arrangement' process is sub process of 'Medicine Stock System' process for arrangement of pharmacy department. This process will receive medicine order information from doctor then, it retrieves out-patient's from Staff and medicine information from Med table and send medicine order information to pharmacy department including save medicine order information into Med_Order and detail of medicine order into OrderDel table. Then it receives medicine arrangement information from pharmacy department and update medicine order information into Med_Order and detail of medicine order into OrderDel table and send medicine arrangement information to 'Medicine Reduction' process.
Output	:	Medicine Order, Detail of Medicine Order and Medicine Arrangement

PSPEC : 2 Medicine Reduction		
Input	:	Medicine Arrangement Information , NoInStock and Remain
Process	:	'Medicine Reduction' process is sub process of 'Medicine Stock System' process for medicine reduction when medicine arrangement. This process will receive medicine arrangement information from 'Medicine Arrangement' process and retrieve NoInStock from Med and remain from Purchase_Lot table for reduction all amount medicine in medicine stock and amount medicine of each lot medicine, then update NoInStock into Med and remain into Purchase_Lot table and send medicine arrangement information to 'Receipt' process.
Output	:	Medicine Arrangement Information, Remain and NoInStock

PSPEC : 3 Receipt		
Input	:	Medicine Arrangement Information, Payment Information, Medicine Order Information, Detail of Medicine Order, Out-patients and Medicine Information
Process	:	'Receipt' process is sub process of 'Medicine Stock System' process for display receipt to cashier department. This process will receive medicine arrangement information from 'Medicine Reduction' process and retrieve medicine order information from Med_Order, detail of medicine order from OrderDel, out-patient information from Staff and medicine information from Med table, then send receipt to cashier department, then receive payment information from cashier department and save payment information into Med_Order table including send payment information to 'Medicine Dispensation' process.
Output	:	Receipt and Payment Information

PSPEC : 4 Medicine Dispensation		
Input	:	Payment Information, Medicine Order and Detail of medicine order, Out-patients and Medicine Information
Process	:	'Medicine Dispensation' process is sub process of 'Medicine Stock System' process for medicine dispensation. This process will receive payment information from 'Receipt' process and retrieve medicine order information from Med_Order, detail of medicine order from OrderDel, out patient information from Staff and medicine information from Med table, then send medicine order information to be paid to pharmacy department, then receive medicine dispensation information from pharmacy department and save medicine dispensation information into Med_Order table.
Output	:	Medicine Dispensation Information

PSPEC : 5 Medicine Purchase		
Input	:	Remain Medicine Information, Medicine Information, Medicine Agency Information
Process	:	'Medicine Purchase' process is sub process of 'Medicine Stock System' process for medicine purchase. This process will receive remain medicine information from 'Medicine Reduction' process and retrieve medicine information from Med, medicine agency information from Agency table, then send PO to purchase department including save During Purchase and LastAgenID into Med, detail of purchase into Purchase_Del, purchase information into Purchase table.
Output	:	PO, During Purchase, LastAgenID, Detail of Purchase and Purchase Information

PSPEC : 6 Medicine Checking		
Input	:	Receiving Medicine Information, Medicine Information, Purchase Information, Detail of Purchase
Process	:	'Medicine Checking' process is sub process of 'Medicine Stock System' process for checking medicine. This process will receive receiving medicine information from medicine stock department and retrieve medicine information from Med, purchase information from Purchase and detail of purchase from Purchase_Del table. Then, it checks receiving medicine information with purchase information, then update buyamount and buyprice in Purchase_Del and totalprice, stockerID and storedate into Purchase table including update during purchase and NoInStock into Med and detail of keeping medicine into Purchase_Lot.
Output	:	Buyamount, Buyprice, Totalprice, StockerID, Storedate, During Purchase, NoInStock and Detail of Keeping Medicine

4.3 Database Management System

Microsoft SQL server 7.0 is used for design medicine stock database. The database of prototype of medicine stock system for out-patients department of the general hospital comprises of 11 tables below:

1. Agency
2. Dosage
3. Med
4. Med_Order
5. Med_Subgroup
6. OrderDel
7. Purchase
8. Purchase_Del
9. Purchase_Lot
10. Staff
11. Staff_Position

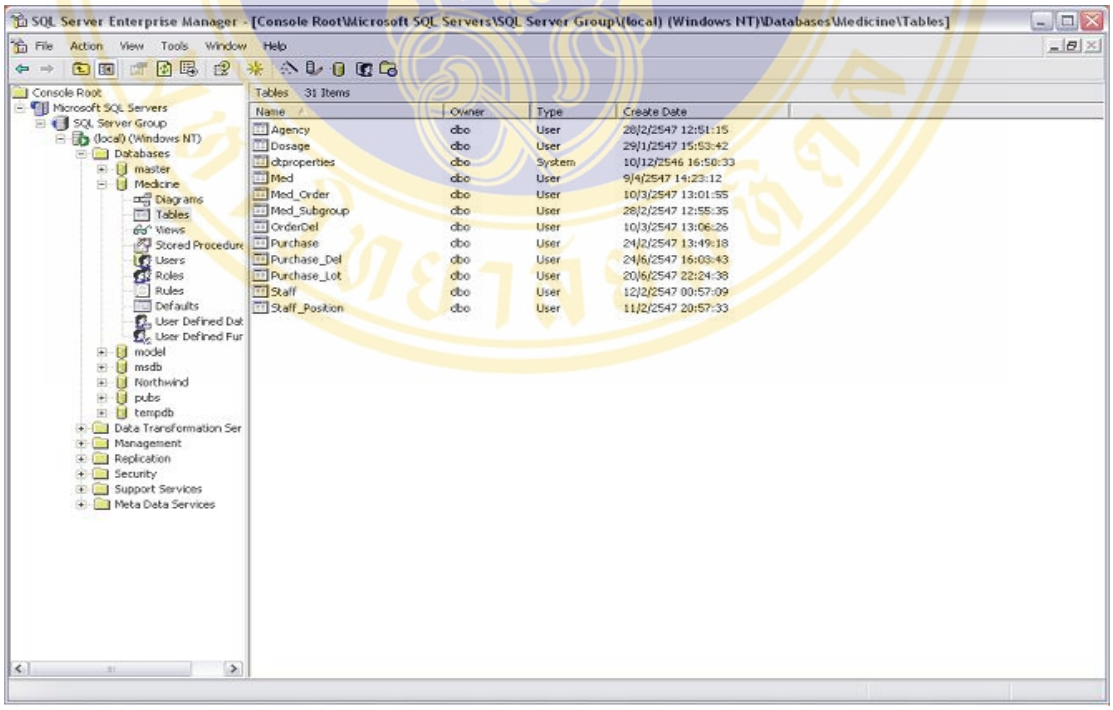


Figure 4.3 Database of prototype of medicine stock system for out-patients department of the general hospital.

4.4 Entity Relationship Diagram

Entity Relationship Diagram (ERD) is especially useful for applications in which data and the relationships that govern data are complex. All data that are input, stored, transformed, and produced within an application. The object relationship pair is the cornerstone of the data model. These pairs can be represented graphically using the entity relationship diagram (ERD). Sets of primary components are identified for the ERD: data objects, attributes, relationships, and various type indicators. Entities are represented by table and relation between fields in tables or queries are represented by connecting lines. Fields of a table are shown into table. The ERD of development of application program of medicine stock system for out-patients department of the general hospital are shown in Figure 4.4.

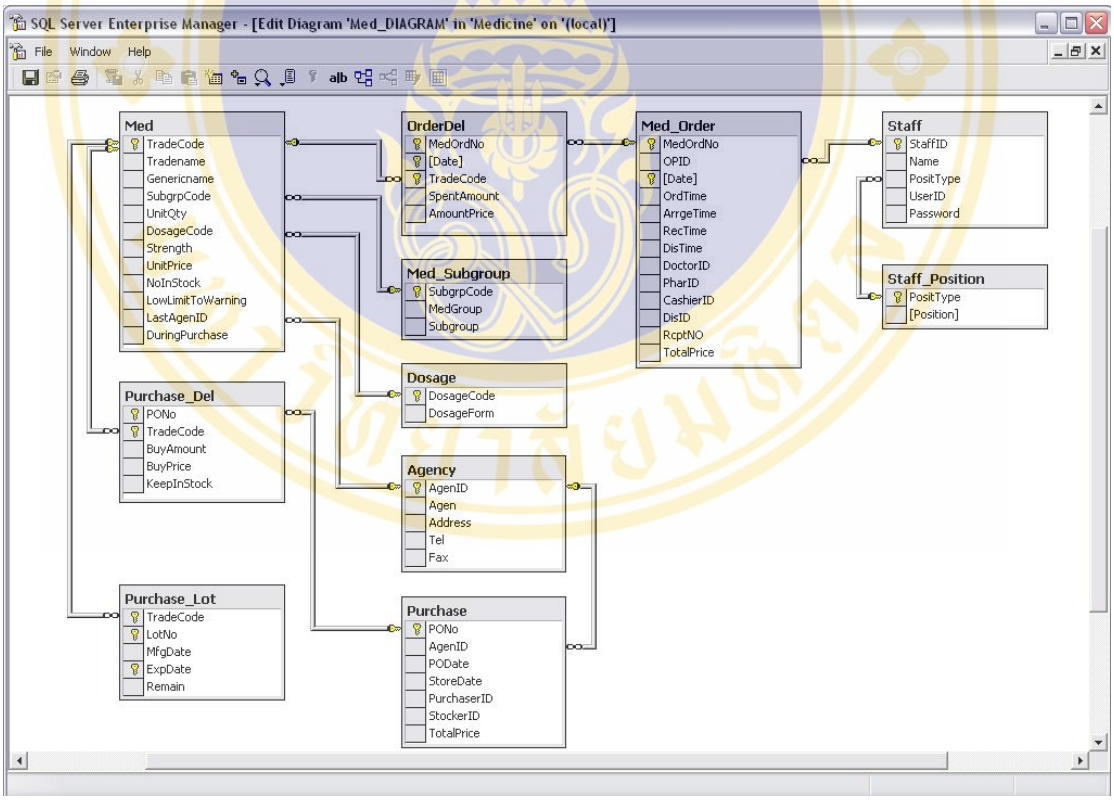


Figure 4.4 Entity Relationships Diagram of Medicine Stock System.

4.5 Data Dictionary

The data dictionary is the data content of database. It contains field names, type, size and definitions of the data resource. All tables of the antibiotics stock system is designed under a database named MEDICINE as the following details:

Table : Med_Order

This table is applied for storing information regarding the medicine dispensation data, which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
MedOrdNo	Y	Nvarchar	8	Medicine order number
OPID	N	Nvarchar	8	Out-patients's Identity
Date	Y	Datetime	8	Date of medicine order
OrdTime	N	Datetime	8	Time of medicine order
ArrgeTime	N	Datetime	8	Time of arrangment medicine
RecTime	N	Datetime	8	Time of receipt
DisTime	N	Datetime	8	Time of dispensation medicine
DoctorID	N	Nvarchar	8	Doctor 's identity
PharID	N	Nvarchar	8	Pharmacist's identity
CashierID	N	Nvarchar	8	Cashier's identity
DisID	N	Nvarchar	8	Dispensation staff's identity
RcptNO	N	Nvarchar	8	Receipt number
TotalPrice	N	Money	8	Sum of all medicines price that order

Table : Dosage

This table is applied for storing information regarding the dosage form data of trade name, which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
DosageCode	Y	Nvarchar	2	Dosage form code
DosageForm	N	Nvarchar	40	Dosage form

Table : Purchase_Del

This table is applied for storing information regarding the medicine purchase detail , which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
TradeCode	Y	Nvarchar	8	Trade name code
PONo	Y	Nvarchar	9	PO number
BuyAmount	N	Numeric	9	Amount of medicine that to be purchased
BuyPrice	N	Money	8	Totalprice of medicine
KeepInStock	N	Bit	1	Status keeping medicine : null = No keeping medicine 1 = Keeping medicine

Table : Staff

This table is applied for storing information regarding the staff's data involving with five departments of medicine stock system , which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
StaffID	Y	Nvarchar	8	Staff's identity
Name	N	Varchar	80	Staff's name
PositType	N	Varchar	2	Staff's position type
UserID	N	Varchar	15	Staff's user ID
Password	N	Varchar	15	Staff's password

Table : Agency

This table is applied for storing information regarding the medicine agency data, which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
AgenID	Y	Nvarchar	4	Medicine agency's identity
Agency	N	Varchar	80	Medicine agency
Address	N	Varchar	120	Address of medicine agency
Tel	N	Varchar	35	Telephone of medicine agency
Fax	N	Varchar	11	Fax of medicine agency

Table : Med_Subgroup

This table is applied for storing information regarding the subgroup data of trade name, which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
SubgrpCode	Y	Nvarchar	4	Subgroup code
Subgroup	N	Varchar	40	Subgroup
MedGroup	N	Varchar	40	Medicine group

Table : Purchase_Lot

This table is applied for storing information regarding the details of trade name in antibiotics group , which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
TradeCode	Y	Nvarchar	9	Trade name code
LotNo	Y	Nvarchar	12	Lot of expiry date of medicine
MfgDate	N	Datetime	8	Manufacturing date of medicine
ExpDate	Y	Datetime	8	Expiry date of medicine
Remain	N	Numeric	9	Remain medicine in medicine stock

Table : Purchase

This table is applied for storing information regarding the medicine purchase data, which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
PONo	Y	Nvarchar	8	PO number
AgenID	N	Varchar	6	Medicine agency ’s identity
PODate	N	Datetime	8	Date of PO
StoreDate	N	Datetime	8	Date of medicine storing
PurchaserID	N	Varchar	8	Purchaser’s identity
StockerID	N	Varchar	8	Stocker’s identity
TotalPrice	N	Money	8	Sum of all medicines price from purchase

Table : Medicine

This table is applied for storing information regarding the details of trade name in antibiotics group , which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
TradeCode	Y	Nvarchar	9	Trade name code
Trade name	N	Varchar	45	Trade name
Genericname	N	Varchar	80	Generic name
SubgrpCode	N	Nvarchar	4	Subgroup code
UnitQty	N	Nvarchar	10	Quantity per package
DosageCode	N	Nvarchar	2	Dosage form code
Strength	N	Nvarchar	40	Strength
UnitPrice	N	Money	8	Price per unit
NoInStock	N	Numeric	9	Amount medicine in medicine stock
LowLimitToWarning	N	Numeric	9	Amount medicine low level
LastAgenID	N	Nvarchar	4	Medicine agency’ s identity in purchasing recently
DuringPurchase	N	Bit	1	Status purchase of medicine : 0 No Purchase 1 DuringPurchase

Table : OrderDel

This table is applied for storing information regarding the dispensation medicine detail, which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
MedOrdNo	Y	Nvarchar	8	Number of medicine order
TradeCode	Y	Nvarchar	8	Trade name code
SpentAmount	N	Numeric	9	Amount medicine of medicine order
AmountPrice	N	Money	8	Price to be received from amount medicine that order in a trade name

Table : Staff_Position

This table is applied for storing information regarding the position of staff involving with medicine stock system, which is available at the MEDICINE as the following details;

Field Name	Primary Key	Data Type	Length	Definition
PositType	Y	Varchar	2	Staff's position type
Position	N	Varchar	30	Staff's position

4.6 System Security

Application of this system has checking privilege in using it. User name and password is used in verify each user's authentication. The permission in this system has been established for 6 groups of user for access in each screen as follow:

Group 1: Administrator

Group 2: Doctor

Group 3: Pharmacy department

Group 4: Cashier department

Group 5: Purchaser department

Group 6: Stocker department

Table 4.1 Show permission to medicine stock system for each of group users.

Subsystem/permission	System Administrator	Doctor	Pharmacy	Cashier	Purchaser	Medicine Stocker
1. Order medicine	Yes	Yes	No	No	No	No
2. Arrangement medicine	Yes	No	Yes	No	No	No
3. Dispensation medicine	Yes	No	Yes	No	No	No
4. Receiving payment	Yes	No	No	Yes	No	No
5. Purchase medicine	Yes	No	No	No	Yes	No
6. Stock medicine	Yes	No	No	No	No	Yes

4.7 User Interface

The results of analysis and design phase will be used to develop the medicine stock system application. The development phase involves user interface designing and program coding.

Interface screen is user friendly with GUI (Graphic user interface).The user interface of the system is created from Microsoft Visual Basic 6.0. It is in the menu interaction mode. When user open program, it appears login dialog box for accessing forms on MDI Form which is main form. It consists of main menus and submenus which link to sub forms. Each department is visible menus difference which depends on operation its. However, menu user is menu that every departments can visible for log in program, log out program, change own password and exit program. Sub forms in submenus consist of the commands to user can interface with database of medicine stock system difference following operations of user in each department. For example, query, input, set user privilege, exit. The following are main functions of each command.

- Query command will query and display data, which are stored in the database to show on screen such as, datagrid, msflexgrid, combobox, etc.

- Input command is an input new data, deleting or update existing data and save data in the database such as, textbox, command button.
- Set user privilege command for a maintenance user.
- Exit command is an end program.

In this research the connection by ADO(Active X Data Objects) is performed. The functions of add, update and delete are basic methods for modifying the database. During the application development, “bugs”, which are error in coding caused the malfunction of the program or production of incorrect results, could occur. Bugs can be eliminated by the process of debugging, the debugger program. The program is designed to have stop through the program, examine data, and check conditions. The potential risks is debugged as much as possible before implementation the system.

User interface design structure for medicine stock system will be classified by follow operation in each department of out-patients department of the general hospital. Interface of 5 departments is designed and represented with structure charts as follows:

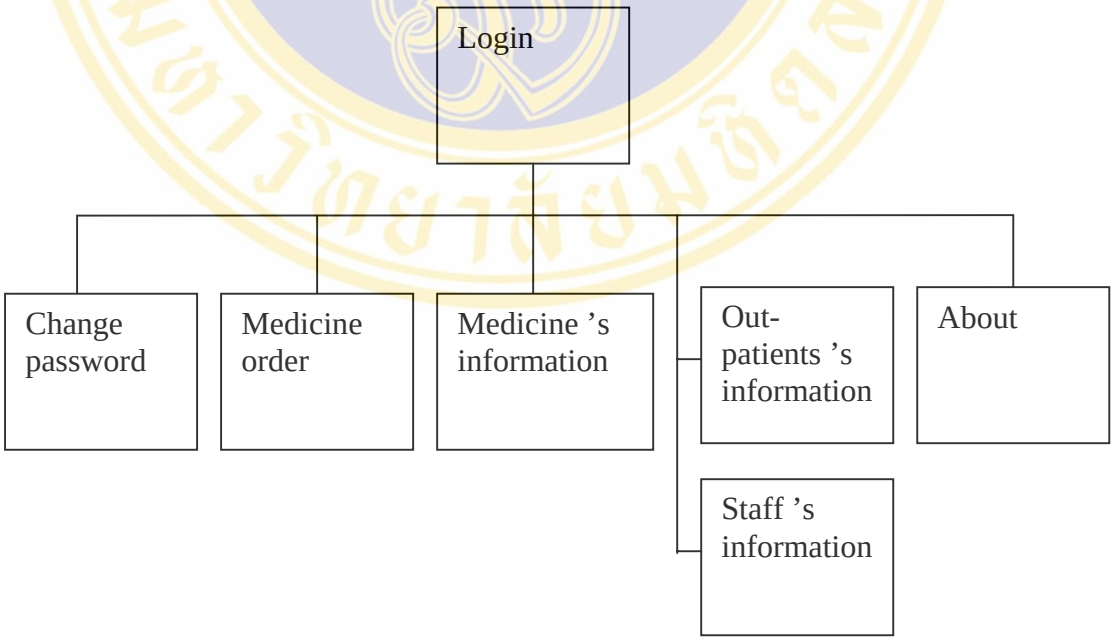


Figure 4.5 User interface of medicine stock system : Doctor.

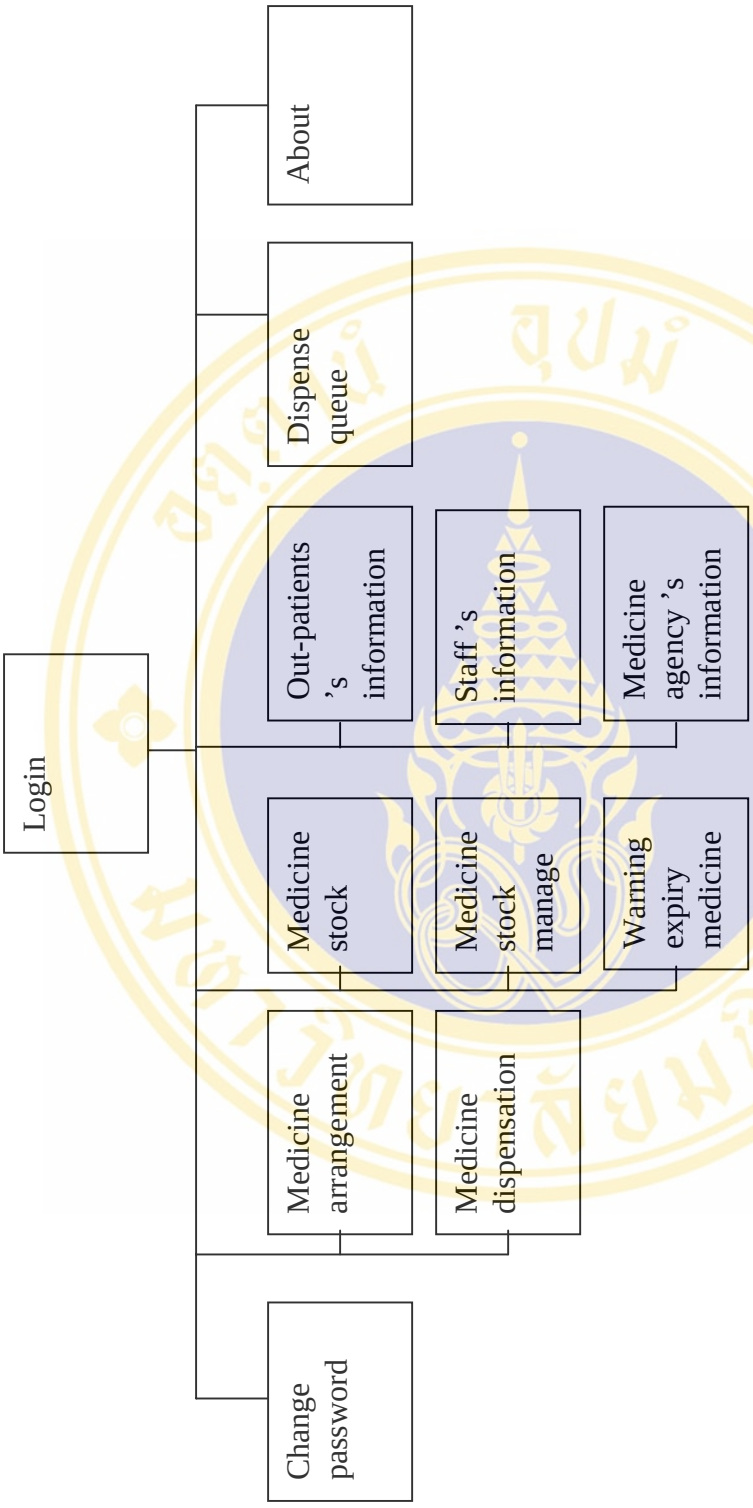


Figure 4.6 User interface of medicine stock system : Pharmacy department.

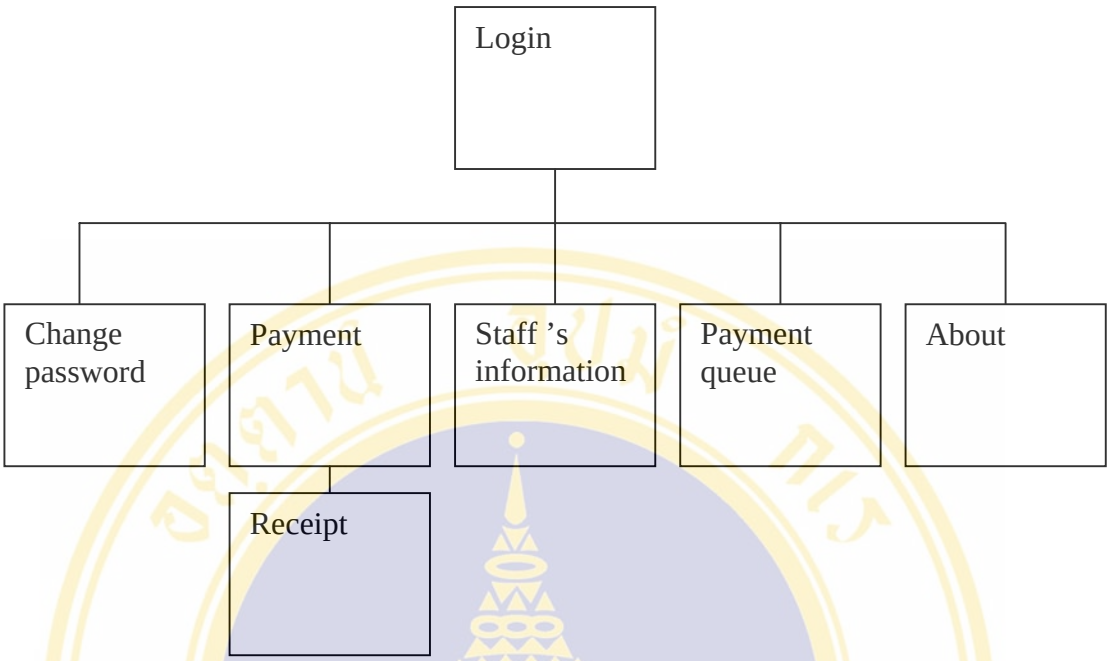


Figure 4.7 User interface of medicine stock system : Cashier department.

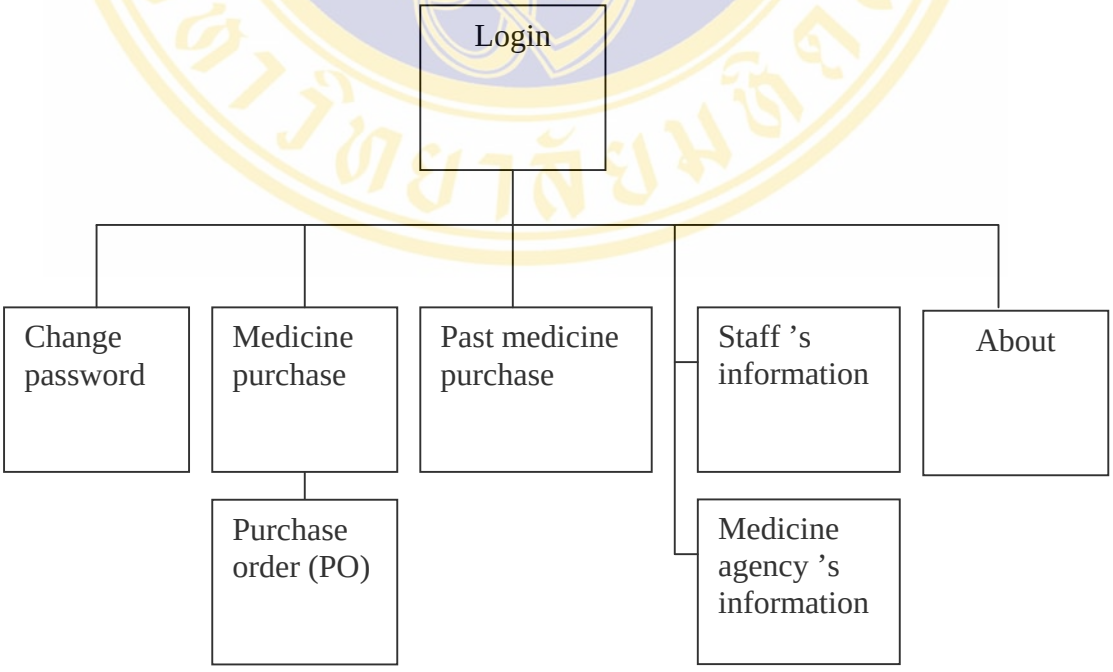


Figure 4.8 User interface of medicine stock system : Purchase department.

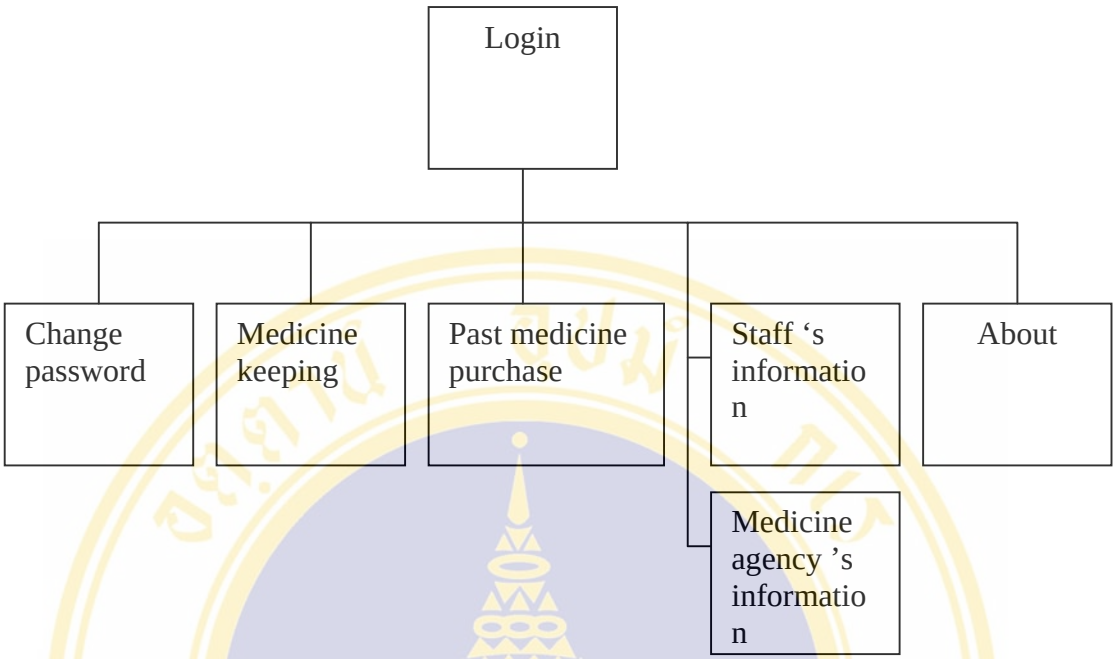


Figure 4.9 User interface of medicine stock system : Medicine Stock System.

The application of medicine stock system for five departments in out-patients department of the general hospital is shown as follows:

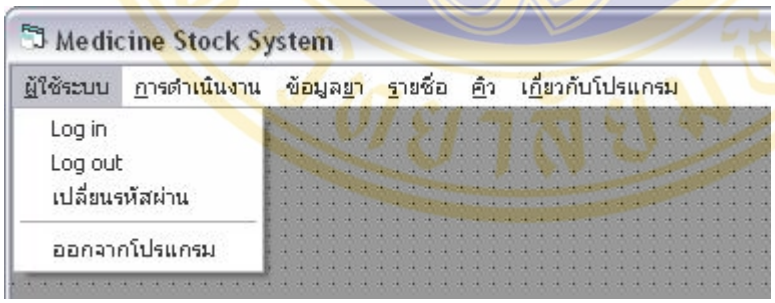


Figure 4.10 Show users menu.

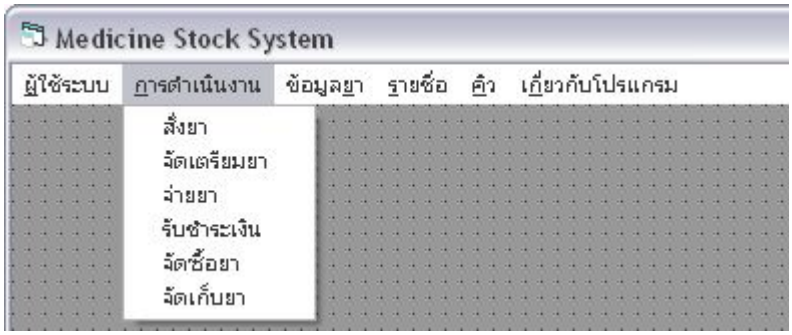


Figure 4.11 Show operations menu.

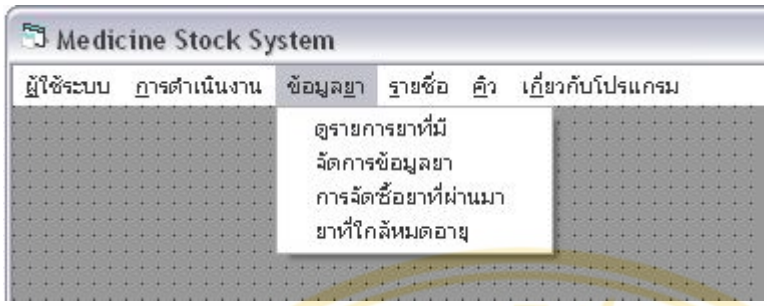


Figure 4.12 Show medicine data menu.

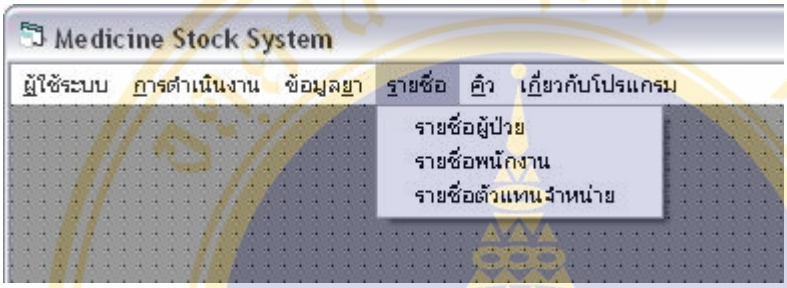


Figure 4.13 Show names menu.

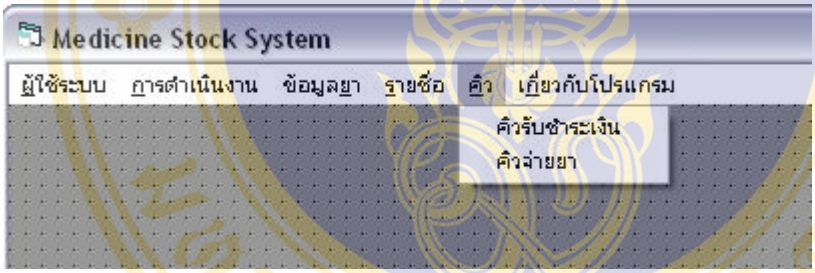


Figure 4.14 Show queue menu.

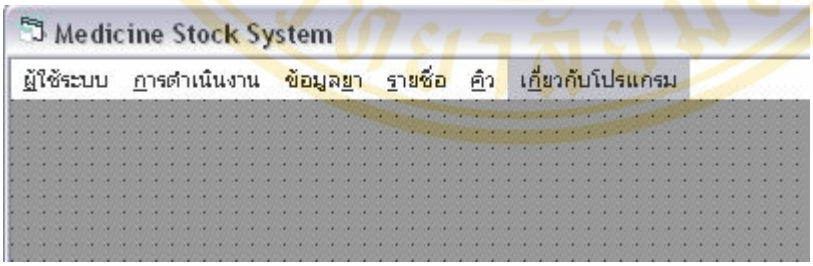


Figure 4.15 Show about program menu.

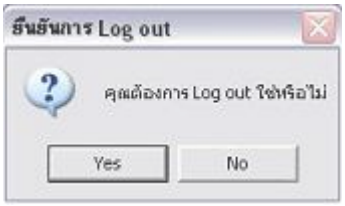


Figure 4.16 Show log out dialog box.

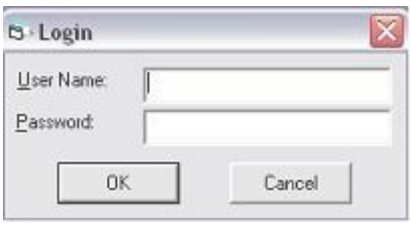


Figure 4.17 Show login screen.

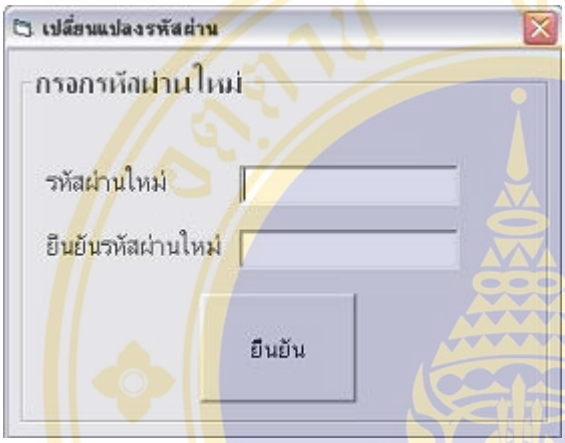


Figure 4.18 Show change password screen.

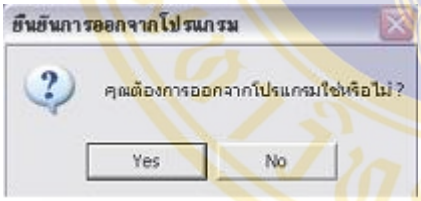


Figure 4.19 Show exit program screen.

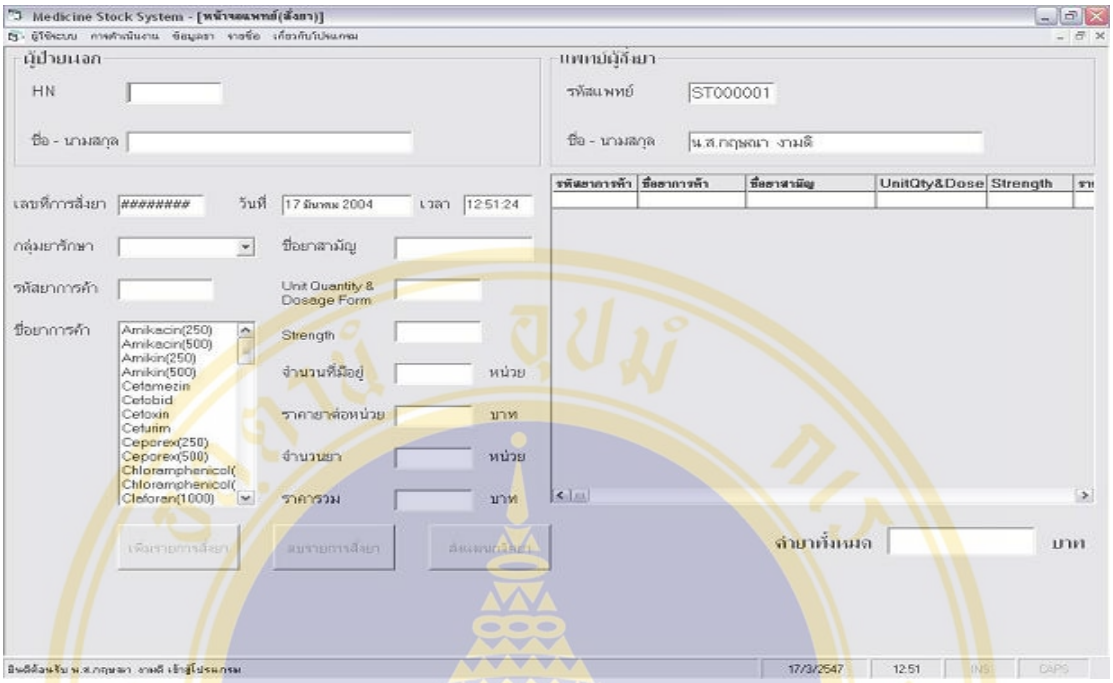


Figure 4.20 Show medicine order screen.

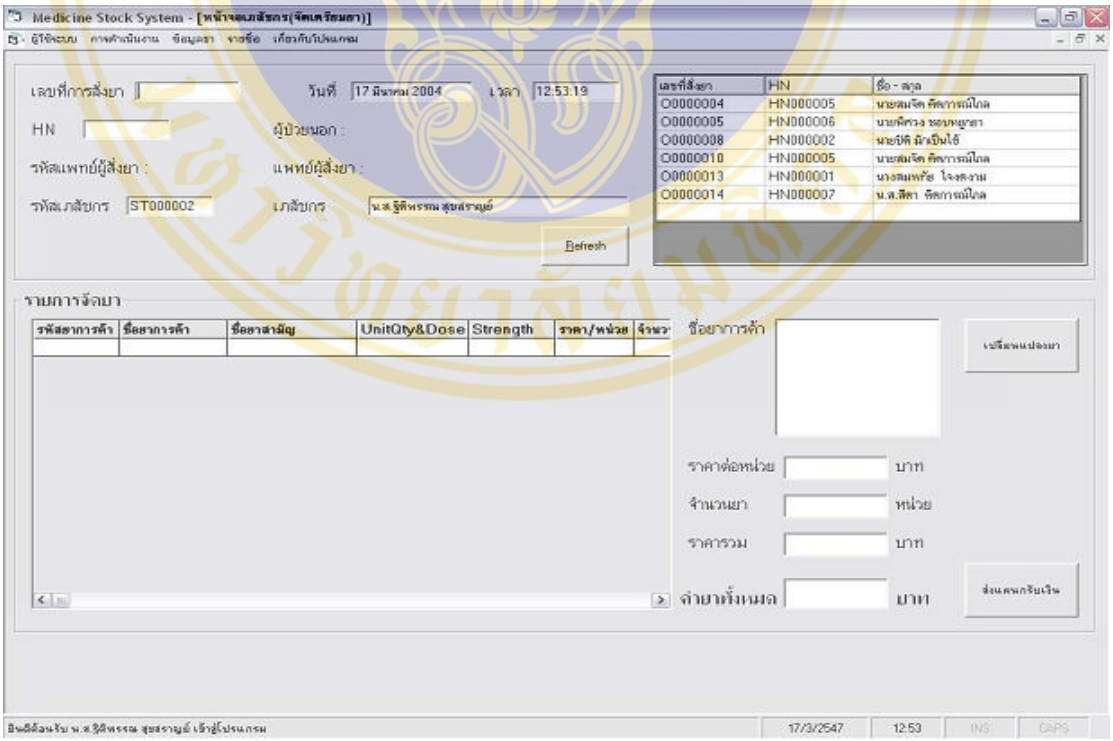


Figure 4.21 Show medicine arrangement screen.

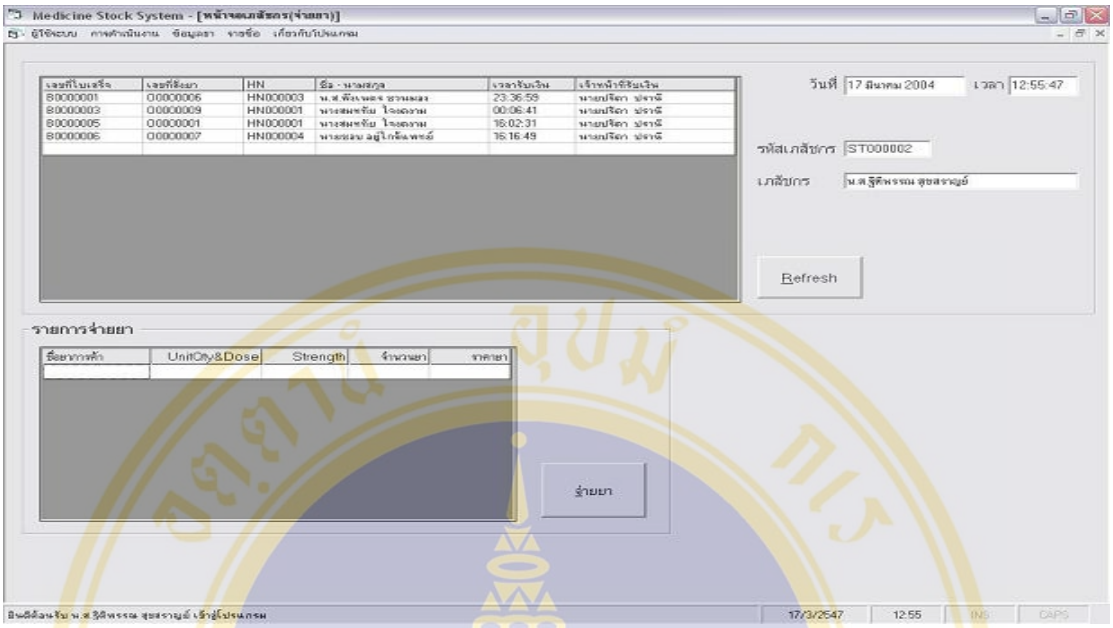


Figure 4.22 Show medicine dispensation screen.

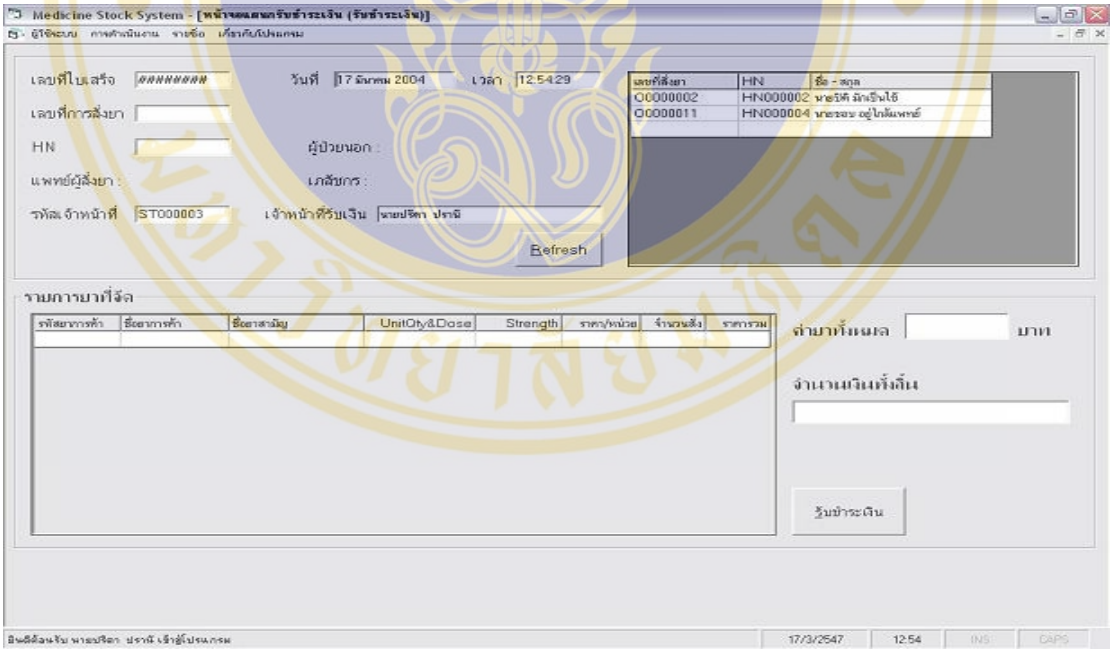


Figure 4.23 Show payment receiving screen.

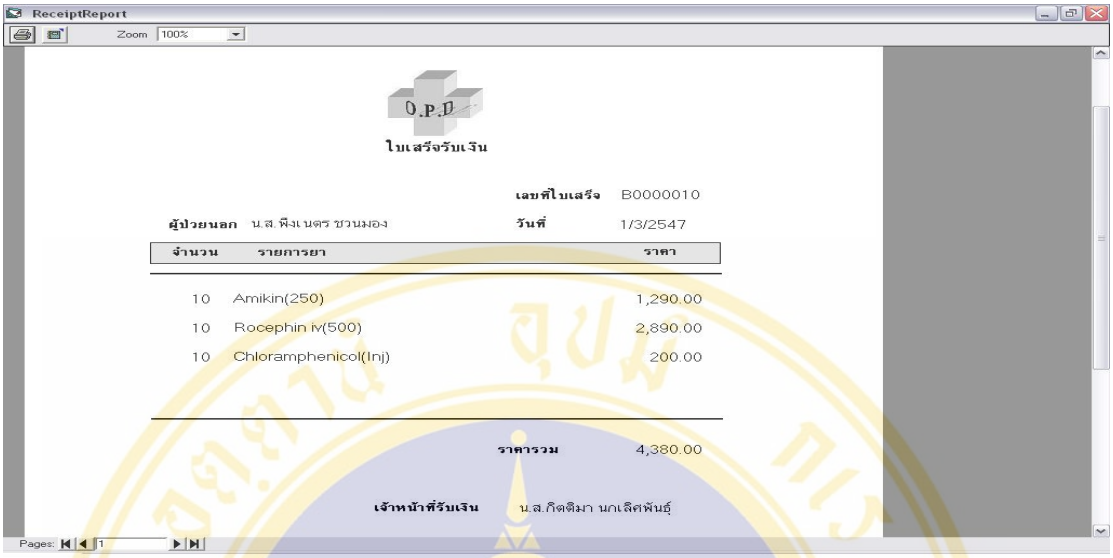


Figure 4.24 Show receipt screen.

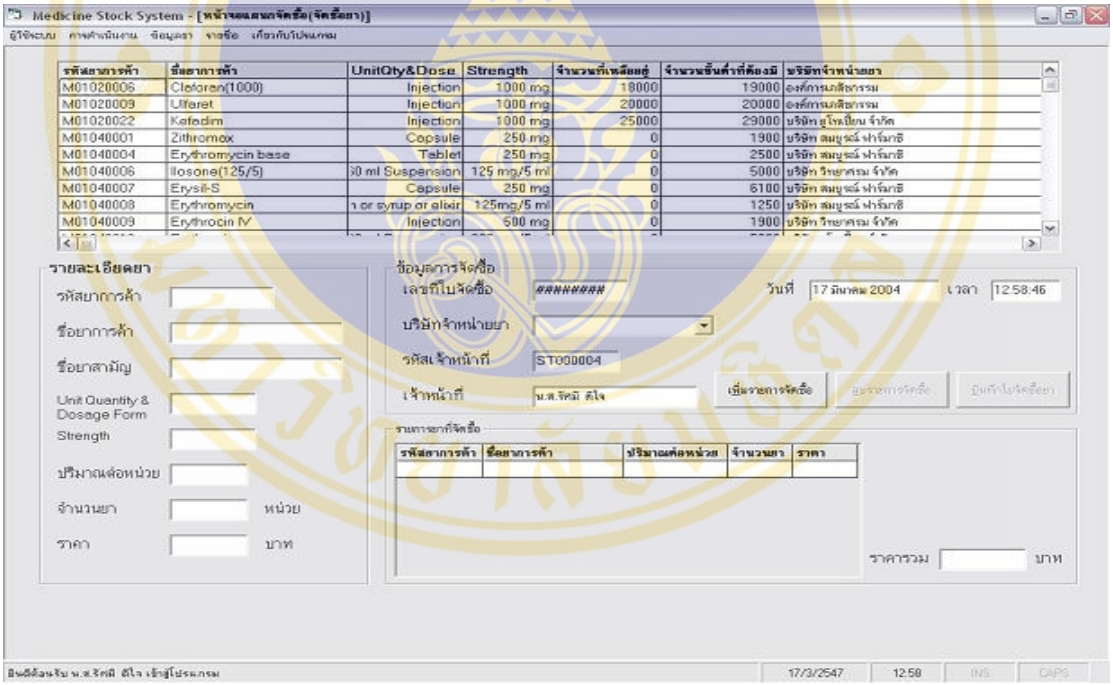


Figure 4.25 Show medicine purchase screen.

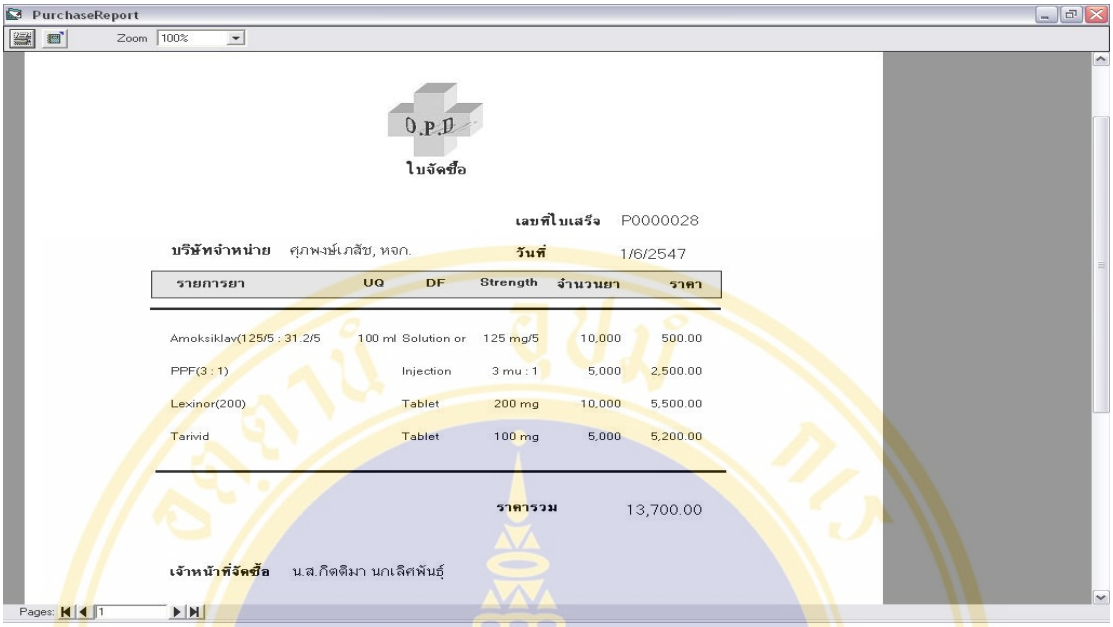


Figure 4.26 Show purchase order (PO) screen.

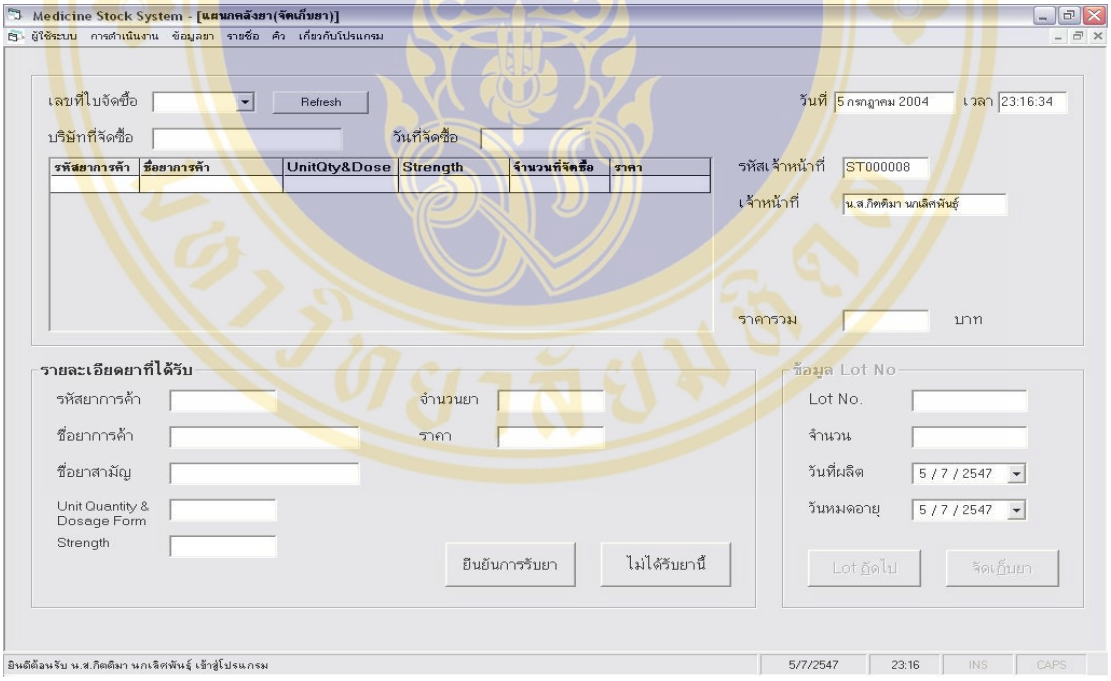


Figure 4.27 Show medicine keeping screen.

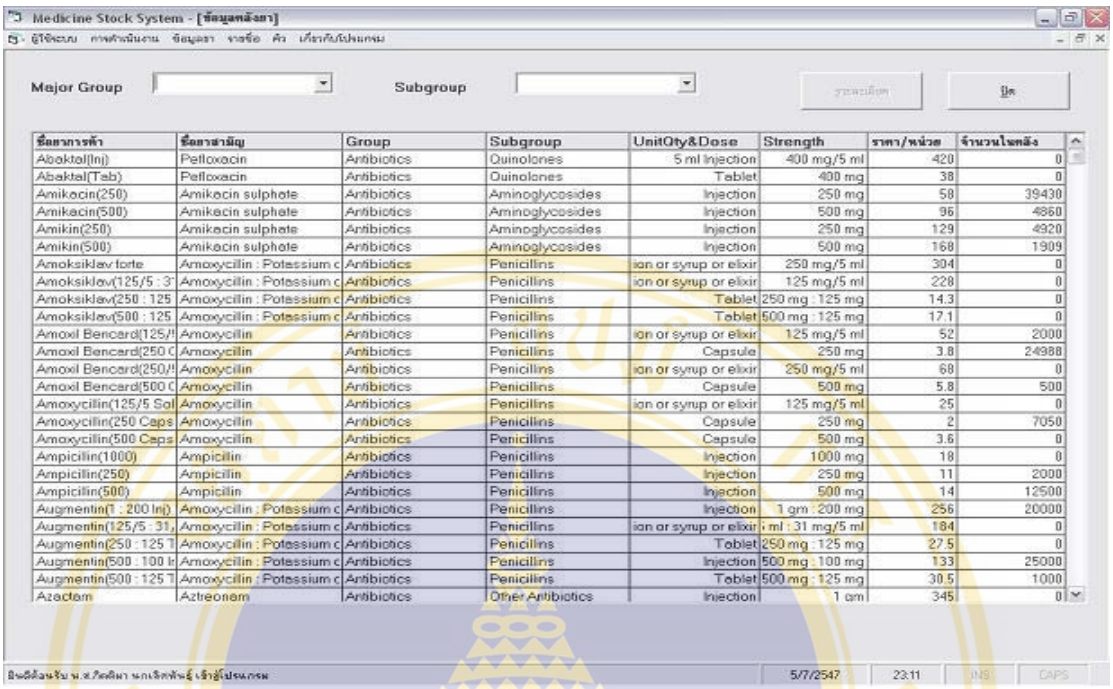


Figure 4.28 Show medicine stock screen.

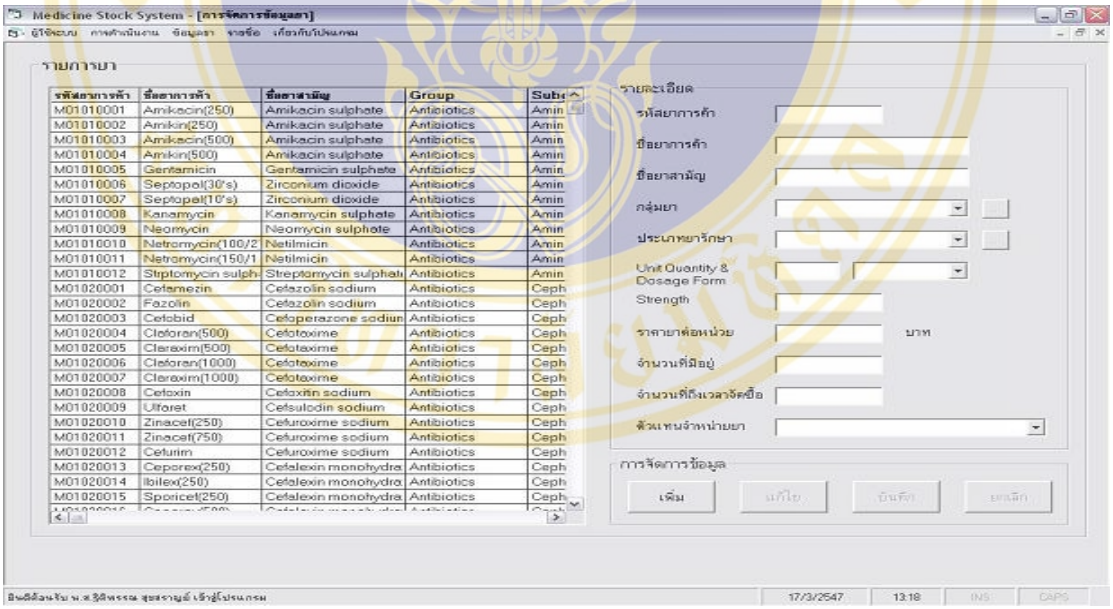


Figure 4.29 Show medicine stock management screen.

Figure 4.30 Show add group medicine screen.

Figure 4.31 Show add subgroup medicine screen.

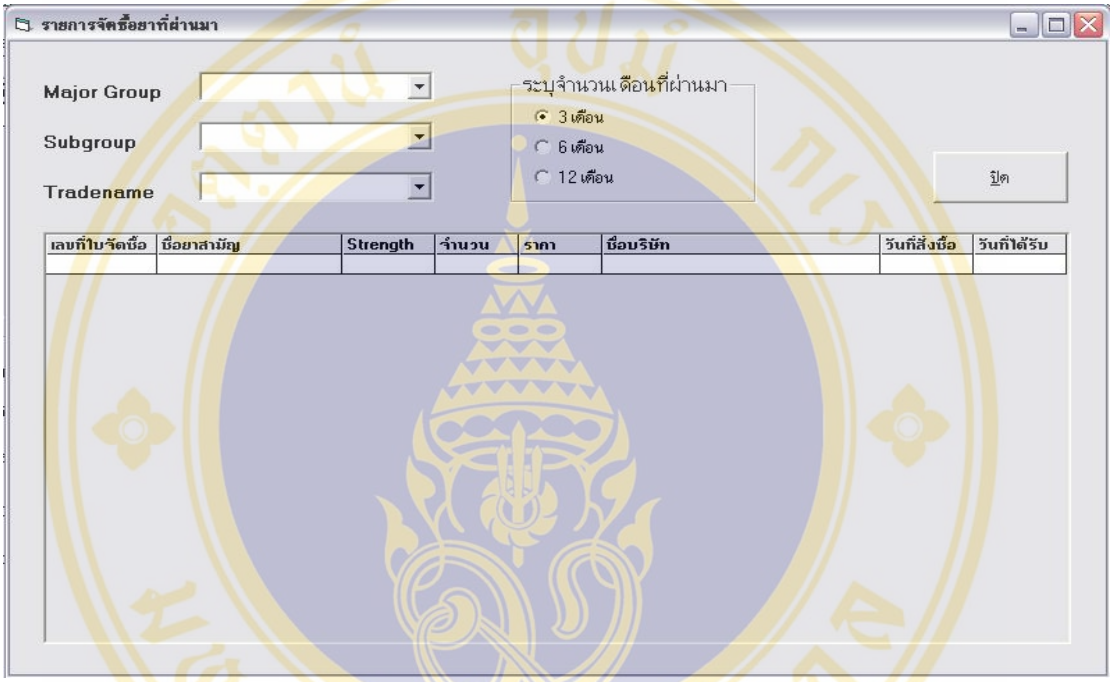
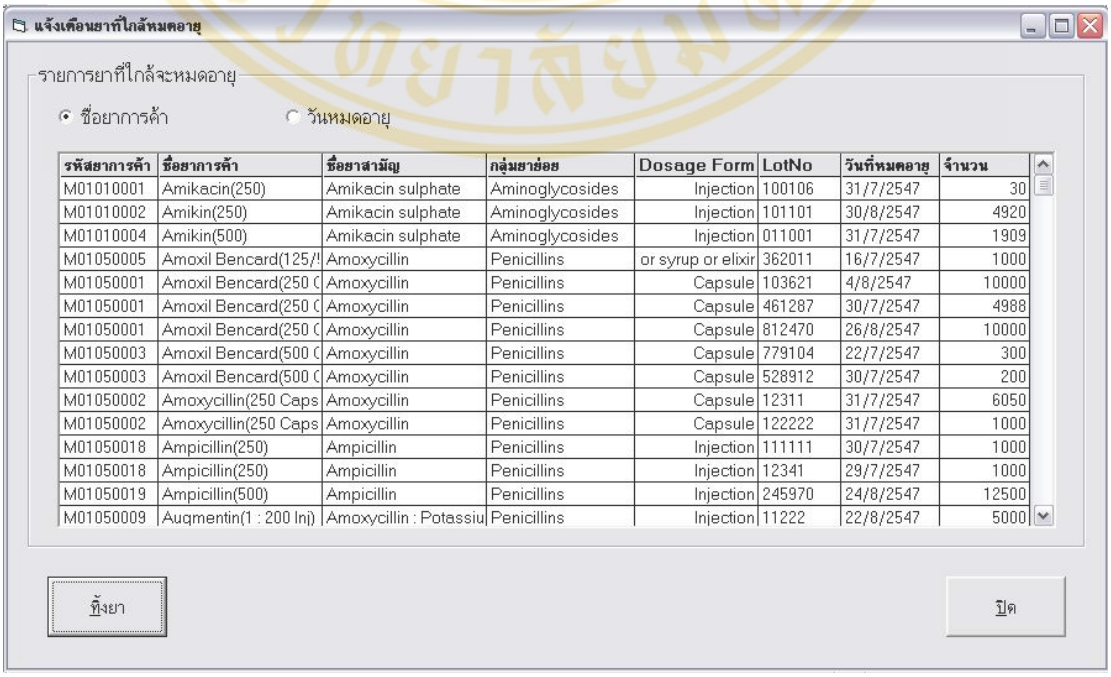


Figure 4.32 Show past purchase screen.



รหัสยาการค้า	ชื่อยาการค้า	ชื่อยาสามัญ	กลุ่มยาย่อย	Dosage Form	LotNo	วันที่หมดอายุ	จำนวน
M01010001	Amikacin(250)	Amikacin sulphate	Aminoglycosides	Injection	100106	31/7/2547	30
M01010002	Amikin(250)	Amikacin sulphate	Aminoglycosides	Injection	101101	30/8/2547	4920
M01010004	Amikin(500)	Amikacin sulphate	Aminoglycosides	Injection	011001	31/7/2547	1909
M01050005	Amoxil Bencard(125/	Amoxycillin	Penicillins	or syrup or elixir	362011	16/7/2547	1000
M01050001	Amoxil Bencard(250 (	Amoxycillin	Penicillins	Capsule	103621	4/8/2547	10000
M01050001	Amoxil Bencard(250 (	Amoxycillin	Penicillins	Capsule	461287	30/7/2547	4988
M01050001	Amoxil Bencard(250 (	Amoxycillin	Penicillins	Capsule	812470	26/8/2547	10000
M01050003	Amoxil Bencard(500 (	Amoxycillin	Penicillins	Capsule	779104	22/7/2547	300
M01050003	Amoxil Bencard(500 (	Amoxycillin	Penicillins	Capsule	528912	30/7/2547	200
M01050002	Amoxycillin(250 Caps	Amoxycillin	Penicillins	Capsule	12311	31/7/2547	6050
M01050002	Amoxycillin(250 Caps	Amoxycillin	Penicillins	Capsule	122222	31/7/2547	1000
M01050018	Ampicillin(250)	Ampicillin	Penicillins	Injection	111111	30/7/2547	1000
M01050018	Ampicillin(250)	Ampicillin	Penicillins	Injection	12341	29/7/2547	1000
M01050019	Ampicillin(500)	Ampicillin	Penicillins	Injection	245970	24/8/2547	12500
M01050009	Augmentin(1 : 200 Inj)	Amoxycillin : Potassiu	Penicillins	Injection	11222	22/8/2547	5000

Figure 4.33 Show warning expiry date of medicine screen.

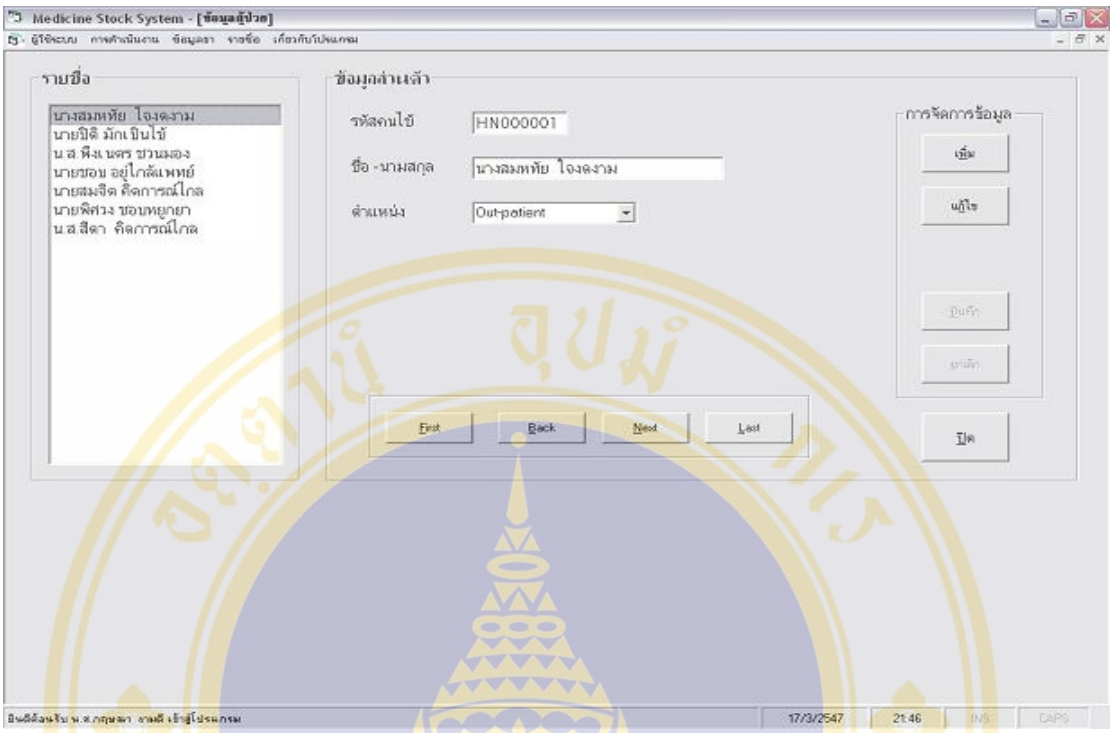


Figure 4.34 Show out-patients's information screen.

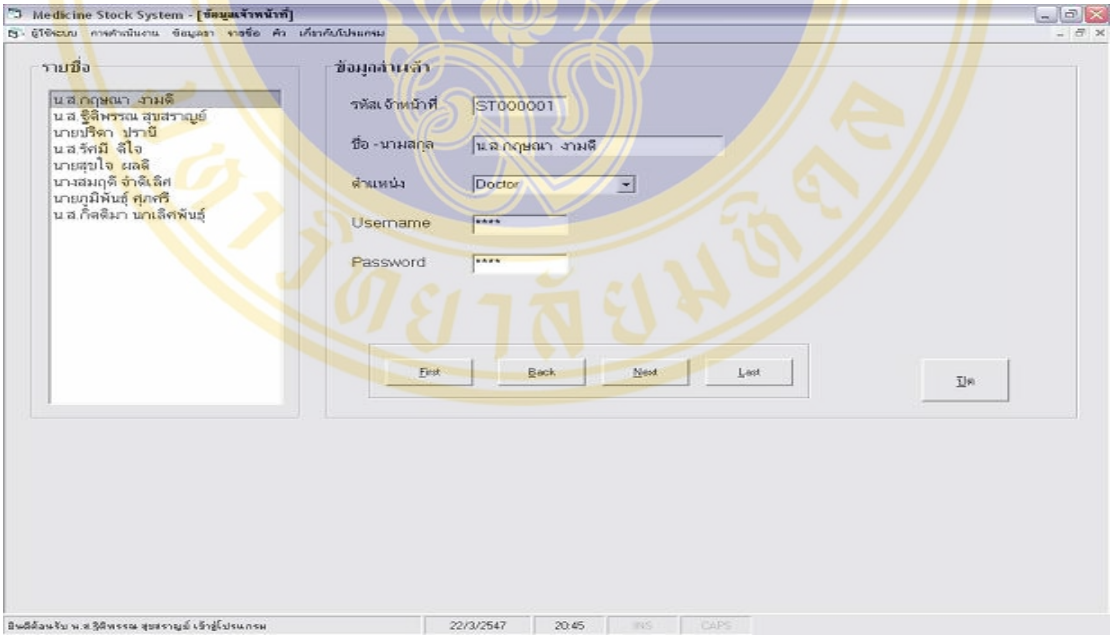


Figure 4.35 Show staff's information screen.

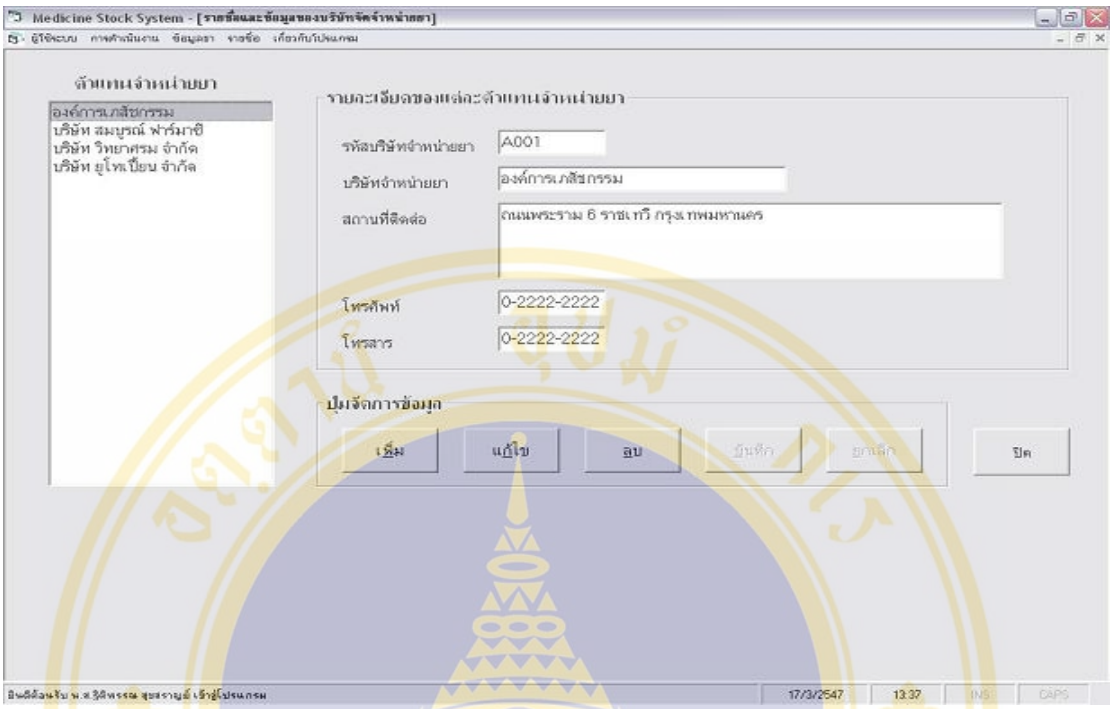


Figure 4.36 Show medicine agency's information screen.

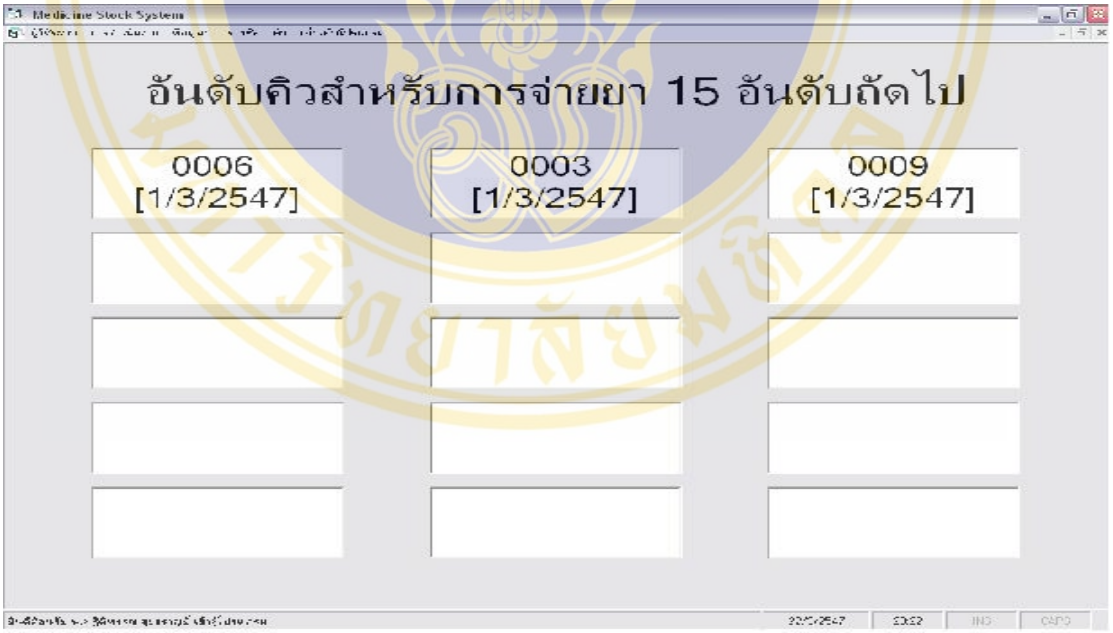


Figure 4.37 Show queue of dispensation screen.

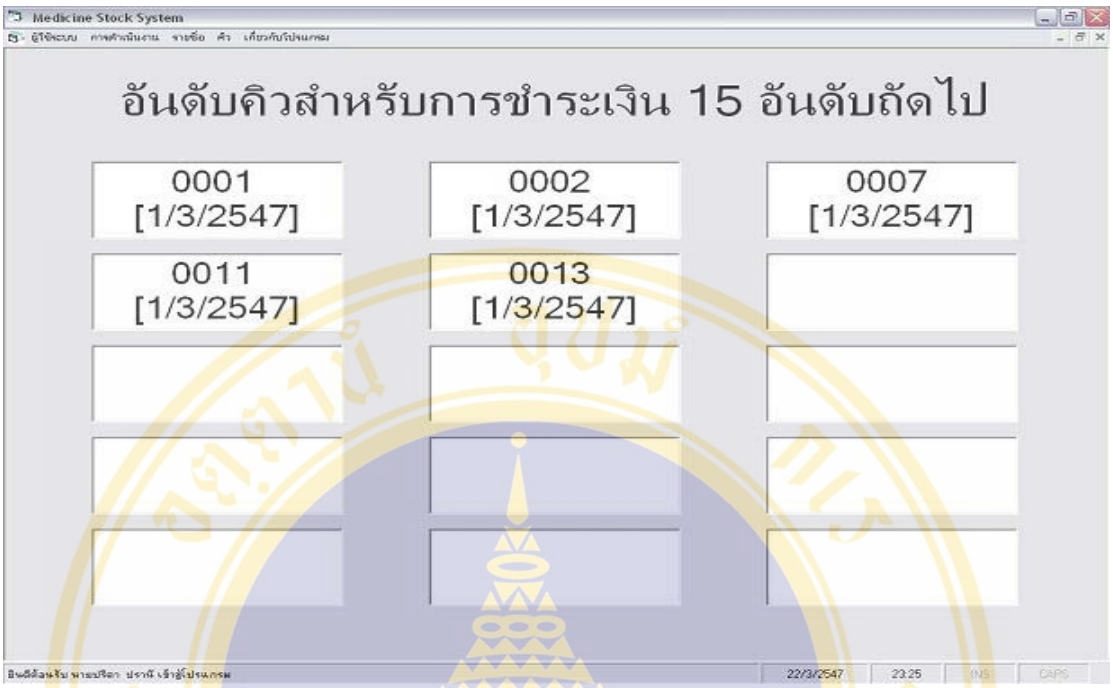


Figure 4.38 Show queue of payment screen.

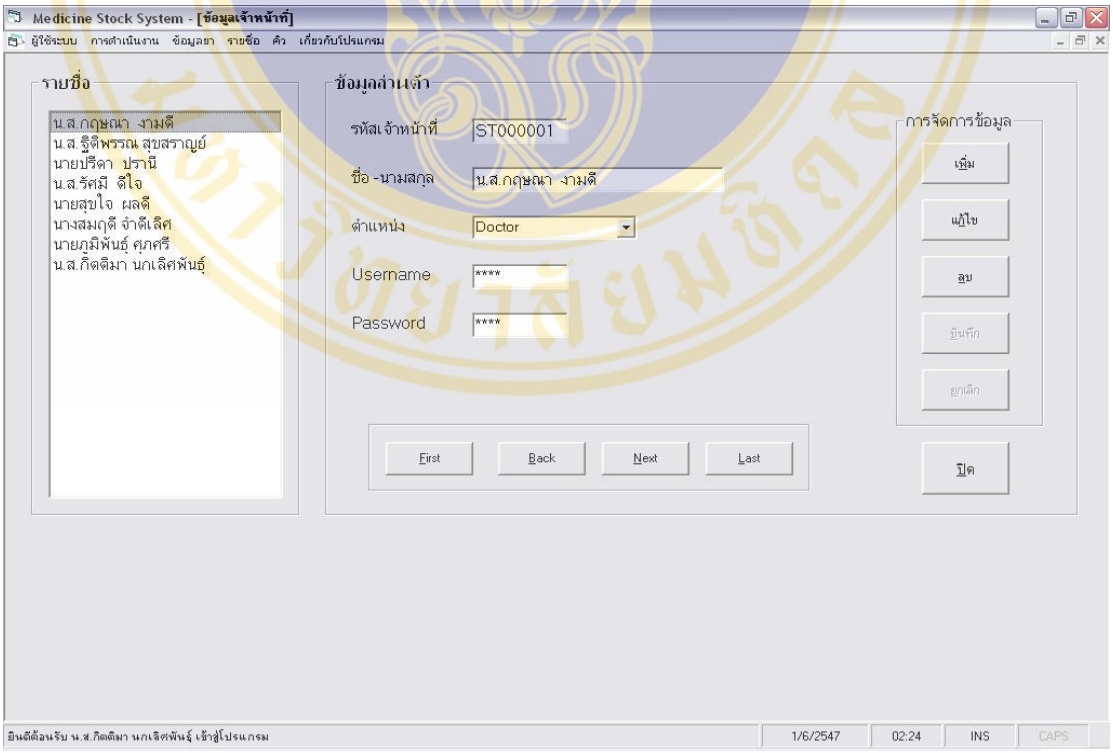


Figure 4.39 Show staff's information screen of system administrators.

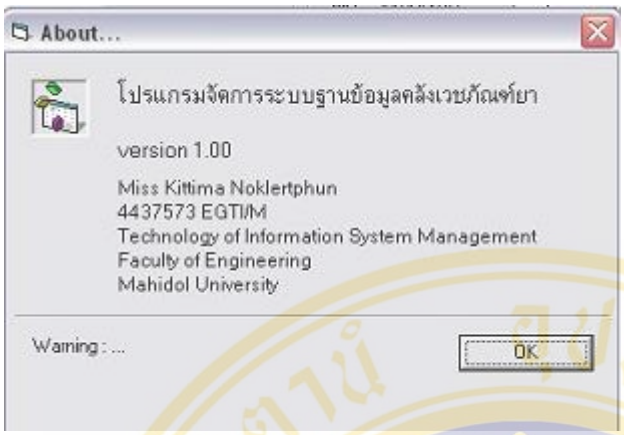


Figure 4.40 Show about program screen.

In part of system administrators can access all screens of 5 departments. Especially, the staff's information screen which they can see add, update, save, delete button whereas every departments can not see these buttons.

4.8 Program Testing

The testing is aimed at the program performs correctly function. Testing phrases are divided into 3 steps:

4.8.1 Object testing

Objects mean command buttons, text boxes, list boxes, labels and other controls that are combined into a Form. Object testing is a testing individual objects in each form to ensure that they operate correctly. For example, "First" command button was tested that it retrieves correct data from database and brings data to objects which is used in display data correctly and perfectly. All of objects must be tested. Result of testing is that objects perform the correct functions.

4.8.2 Form testing

It is a testing the overall functions of objects in individual interface forms. One form consists of several objects. Each object has a unique function. When they are integrated into a form, they may operate unsuitable functions with one another or some errors arise. Therefore, form testing is needed for checking these unpredictable errors.

4.8.3 System testing

The forms are integrated to make up system. When individual form is tested until satisfaction, another importance testing is an integrated testing or called system testing. The testing is concerned with finding errors which result from unanticipated interactions between forms and form objects. The testing process is input the testing data into the database, deleting and editing data via program interface, querying particular data from database, printing. Result found that data in the database could be added, deleted or edited correctly. Program can retrieve data correctly but it must take a few seconds to processing in some commands. Reports can be printed to printer correctly and quickly.

CHAPTER 5
DISCUSSION

The result of study achieved for prototype of medicine stock system for out-patient department of the general hospital. This system supports medicine dispensing to out-patientsand manage medicine in medicine stock.

5.1 Concept of Application Software Development

The application of medicine stock system is developed for easily to use with GUI (Graphic User Interface) by using Microsoft Visual Basic 6.0. It is application program which used for design interface of this system. It provides necessary many tools for developing graphical application such as forms and controls. Developer can build powerful applications quickly and easily. Users enable to retrieve data from database easily by interface building on application. In the security of application, application provides for many user to access data from permit rights that granted to access. It is comfortable for doctor, pharmacy department, cashier department, purchase department, medicine stock department in using this application.

The medicine stock system for out-patient department of the general hospital has problems from the processes in dispensation to out-patients can be concluded as follows;

- The process of sending prescription to pharmacy department and cashier department take long time.
- Doctor prescription and collecting money may be not accurate.
- The medicine in stock and the amount used are controversial.

For the problems as listed above, the software application design and development the prototype of medicine stock system for out-patient department of the general hospital is considered as solution in old fashion and is expected to bring about the following results:

- To bring computer technology helping in processes of dispensing medicine to out patient.
- The doctor can order medicine on screen of computer and the data of prescription can saved including data from operations of each department in out-patient department of the general hospital to be saved into database of medicine stock system.
- To alarm the pharmacist about the amount of medicine left in stock and to warn the expiry date of medicine to pharmacist of pharmacy department
- To give information of medicine agency which ordered the last time and to warn medicine purchaser when the amount of medicine decrease before not enough for dispensing medicine to out patient.
- When medicine stock department put amount of medicine in stock, this system can increase the amount itself.
- Medicine reduction of system is sorted by expiry date of medicine. However, if medicine has several lot that is same expiry date ,will be sorted by Lot NO.

5.2 Strength of The Application Software Development

5.2.1 To shorten the processes of dispensation medicine to out patient.

5.2.2 To avoid error from doctor prescription and collecting money.

5.2.3 To prevent incorrect medicine stock.

5.3 Database of Medicine Stock System

The analysis and design the application is performed by using Microsoft SQL Server 7.0,as RDBMS (Relational Database Management System). It is suitable to create and manage relational database. It is easy to use and understand and store a lot of data. Table of this system comprises of 11 relate tables.

5.4 Tools and Technique used in the system

5.4.2 Software

- Programming

The application was developed by using Visual Basic 6.0, as a tool to construct user interface between database and users. It was high flexible program to used developed application and easy to test debugged and guided developer the way to build the application. For the database access, Visual Basic 6.0 provided a powerful Object-oriented method for linking and ADO (Active X Data Objects), which used OLE(Object Linking and Embedding) DB connecting to the database .

For the database that used Microsoft SQL Server 7.0 building up for the database. It was easy to used and have many tools to facilitates for users. In addition, Microsoft SQL Server 7.0 provided Data Transformation Service (DTS) help to transfer various data platforms, and Online Analytical Processing(OLAP) Service used to manage data which gave a lot of values that made rapid analysis and OLAP helped to used the storage data to real-time transaction process like efficiently.

5.5 System Performance

5.5.1 Response time

The response time of application is tested and approved. Each query take about 1-3 seconds. The system has good response time, such as function search by selecting the combo box. However, the response time of this system depends on the hardware performance.

5.5.2 Storage

The storage site in the system is quite small. The system uses the storage for storing database, which is developed by using Microsoft SQL Server 7.0. Database file needed the space less than 8 Megabytes in the application.

5.5.3 Recovery

When the system failed or data be damaged or lost. It can be load backup copy of data and restore data easily with used function backup and restore in Microsoft SQL Server 7.0. which provides an important safeguard for protecting critical data stored in SQL Server database. Backup and restoring a database allows for the complete restoration of data over a wide range of potential system problems: media failure, user errors and permanent loss of a server. Additionally, backup and restoring a database is useful for non system problems, such as moving or copying a database

from one server to another. By backup a database from one computer, and restoring the database to another, a copy of a database can be made quickly. That can processing with least data and integrity loss.

5.5.4 Complexity

The application in this system is not complicated. It is user friendly interface and easily to understand and use.

5.6 Constraints

5.6.1 Users have to trained to use the program.

5.6.2 Five departments in out-patient department of the general hospital have to install computers for doing work in each department.

5.6.3 Medicine stock system has only one antibiotics group to be sampling in database of system.

5.6.4 This system do not store information about medical equipment. It do store the only information about medicine.

5.6.5 This system are designed following process of general dispensation in out-patient department of the general hospital, so it has not operation specification of some hospital.

5.6.6 This system is used only 5 departments in out-patient department of the general hospital, so it does not cover in every department of general hospital.

5.6.7 This system is only prototype of medicine stock system for out-patient department of the general hospital, it is not cover all operations of out-patient department.

5.6.8 This system reduces amount medicine follow expiry date of medicine. Thus, pharmacy have to take medicine following expiry date of it.

CHAPTER 6
CONCLUSION

In this research, we have design screens in operation of 5 departments and administrator by using Microsoft Visual Basic 6.0 and design database by using Microsoft SQL Server 7.0 in the same personal computer

The proposed system, although it is a prototype project it does not covered all module or department of the general hospital, it has been tested, debugged and the result is quite satisfactory. In the application, user can retrieve and manipulate data. In conclusion for this project that covers scopes proposed and objectives.

6.1 Conclusion

The application of medicine stock system is developed by the concept of software development life cycle, which consists of data gathering, system analysis, system design, development application, system testing.

For the system analysis and design phase, the structured design method is chosen. Then a number of structured analysis models are created to meet requirements of the design method. The data flow diagram represents data movement through the system, starts from level 0 DFD (Context Diagram) to level 1 DFD. The entity relationship diagram represents how the entities involved in the system related with one another. The data dictionary has been proposed for describing the content of objects defined during structured analysis. It provides lists of all data elements that pertinent to the system, with precise, rigorous definitions.

The prototype of medicine stock system design and development can support the users of 5 departments in out-patient department of the general hospital to retrieve data for operation in own department from database.

This research is application of technology that relate to and suitable for medicine stock system in out-patient department of the general hospital.

Inquiry from expert and researcher's experience and character of operations can see from the general hospital that is a way to find the operations of departments of the general hospital and to understand of the situation that bring about the good database design.

6.2 Recommendation

6.2.1 Users of 5 departments who use prototype of medicine stock system in out-patient department of the general hospital must have enough knowledge in using computer.

6.2.2 Considering suitable of technology hardware, and software.

6.2.3 For future development one should add screening in application and information in database to cover operations in all departments of general hospital.

6.2.4 This system should add all medicine groups that use in dispensing to out-patients into database of system.

6.2.5 This application should add pictures on command buttons and toolbar for increasing attractive including comfort and easy in using system.

6.2.6 This system involves only medicine stock. The reality operation should have medical equipment for completing in operation of general hospital.

6.2.7 Implementing the add, update and delete process with transaction control will help the database more stable and consistent.

6.2.8 The process of choosing the best suppliers for each items can be improved by adding more criteria to be considered such as quality of medicine, price of medicine. This will help the process meets the real world situation.

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APPENDIX

USER MANUAL

The application of medicine stock system has screens to involve with operation in out-patient department The screens are shown on menu in MDIform for comfort in using. All menus of this system is shown in figure A.1, A.2, A.3, A.4, A.5 ,A.6 as follows:

Figure A.1 Show user menu.

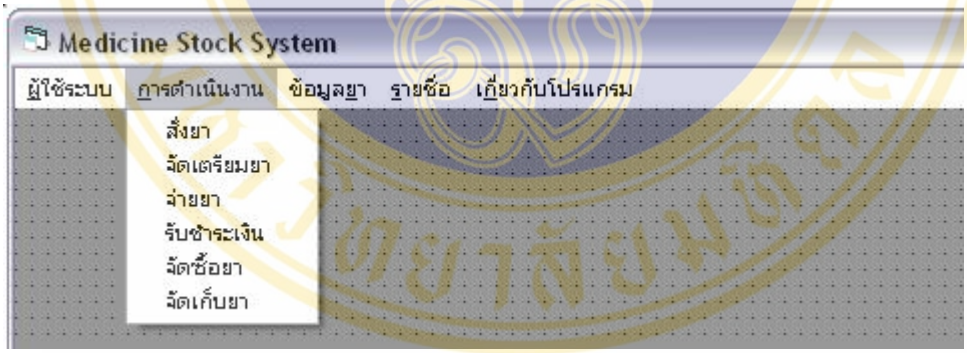


Figure A.2 Show operations menu.

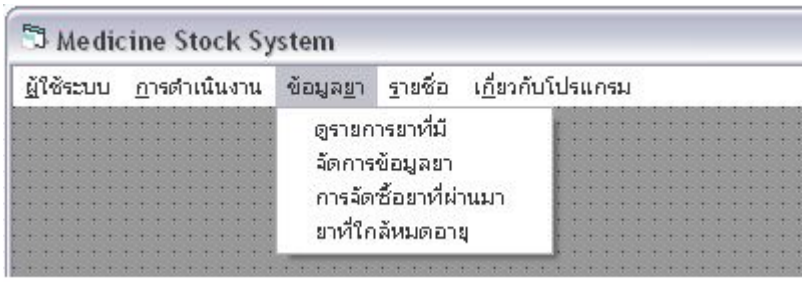


Figure A.3 Show medicine information menu.

Figure A.4 Show names menu.

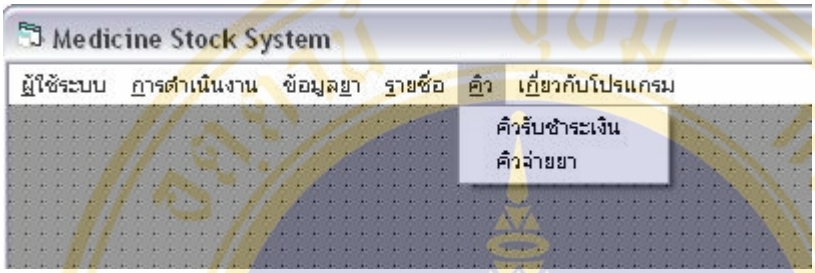


Figure A.5 Show queue menu.

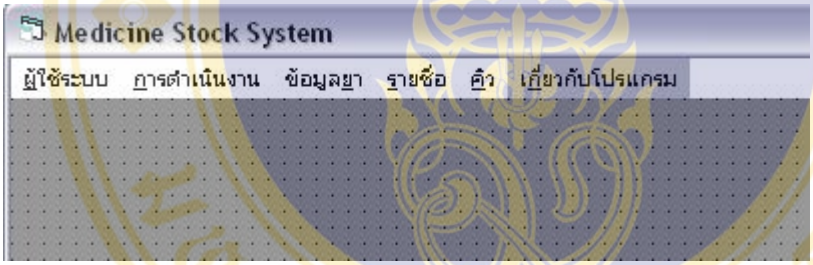


Figure A.6 Show about program menu.

In each submenu of this system can be described about detail its as follows:

1. Login screen : This screen is shown when users of 5 departments require login program of medicine stock system which access to depend on privilege of user in each department. It is shown in figure A.7.This screen comprises of the buttons for login as follows:

1.1 ‘OK’ button

It is button for checking privilege user’s username and password.

1.2 ‘Cancel’ button

It is button for cancel login screen.

Figure A.7 Show login screen.

2. Log out screen : This dialog box is shown when users of 5 departments require login of the other user that it is confirm for access login screen. It is shown in figure A.8. This screen has the buttons for operation as follows:

2.1 ‘Yes’ button

It is button for confirm log out.

2.2 ‘No’ button

It is button for cancel log out.

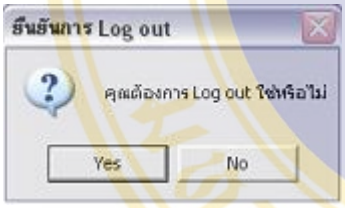


Figure A.8 Show log out screen.

3. Change password : It is shown when users of 5 departments require to change own password. It is shown in figure A.9. This screen has only the button for operation as follows:

3.1 ‘ยืนยัน’ button

It is button for confirm user’s change password.

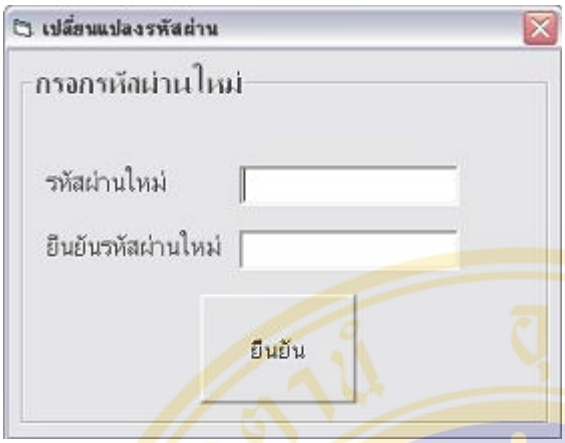


Figure A.9 Show change password screen.

4. Exit program : This dialog box is shown when users of 5 departments require exit from medicine stock program that it is confirm for exit program. It is shown in figure A.10. This screen has the buttons for operation as follows:

4.1 ‘Yes’ button

It is button for confirm exit program.

4.2 ‘No’ button

It is button for cancel exit program.

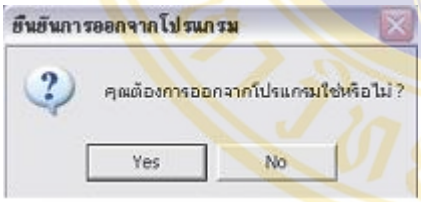


Figure A.10 Show exit program screen.

5. Medicine order : It is shown when doctor requires to order medicine to out patient. It is shown in figure A.11. This screen has the buttons for operation as follows:

5.1 ‘เพิ่มการสั่งยา’ button

It is button for save medicine order.

5.2 ‘ลบการสั่งยา’ button

It is button for cancel medicine order.

5.3 ‘ส่งการสั่งยา’ button

It is button for send medicine order to pharmacy department.

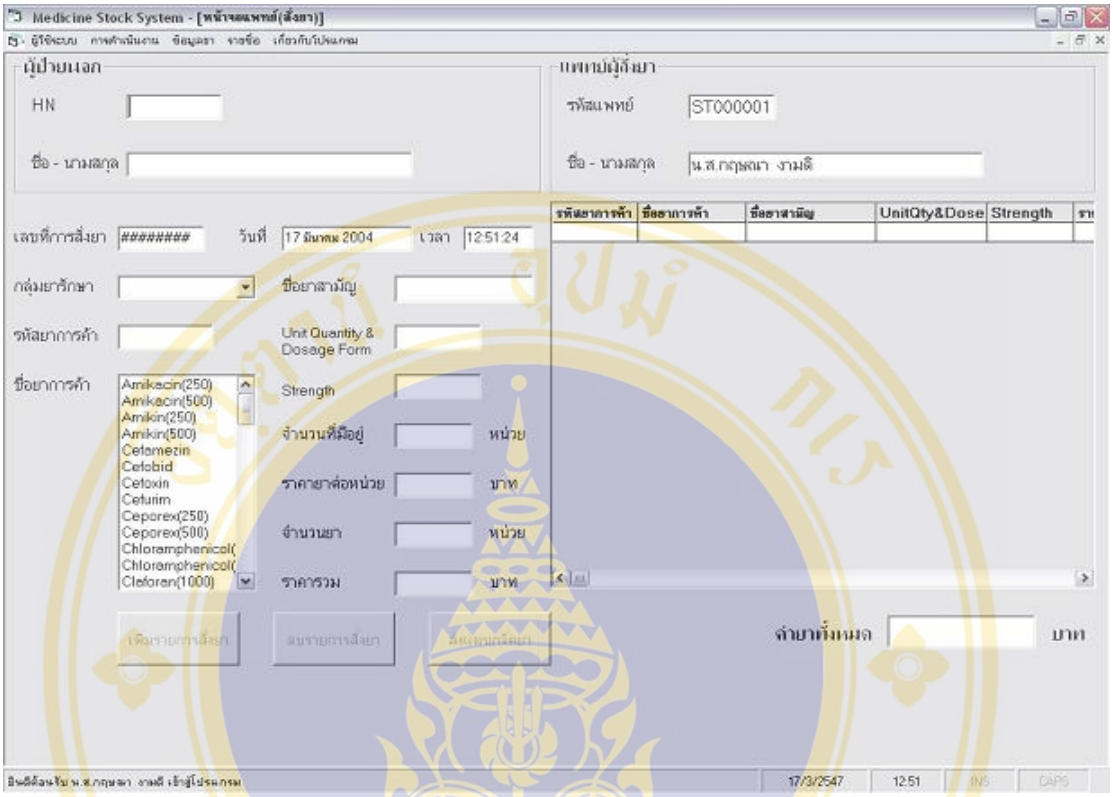


Figure A.11 Show medicine order screen.

6. Medicine arrangement : It is shown when pharmacist of pharmacy department requires to arrange medicine to out patient. It is shown in figure A.12. This screen has the buttons for operation as follows:

6.1 ‘Refresh’ button

It is button for refresh out patient.

6.2 ‘เปลี่ยนแปลงยา’ button

It is button for change medicine to out patient.

6.3 ‘ส่งแผนกรับเงิน’ button

It is button for send medicine arrangement to cashier department.

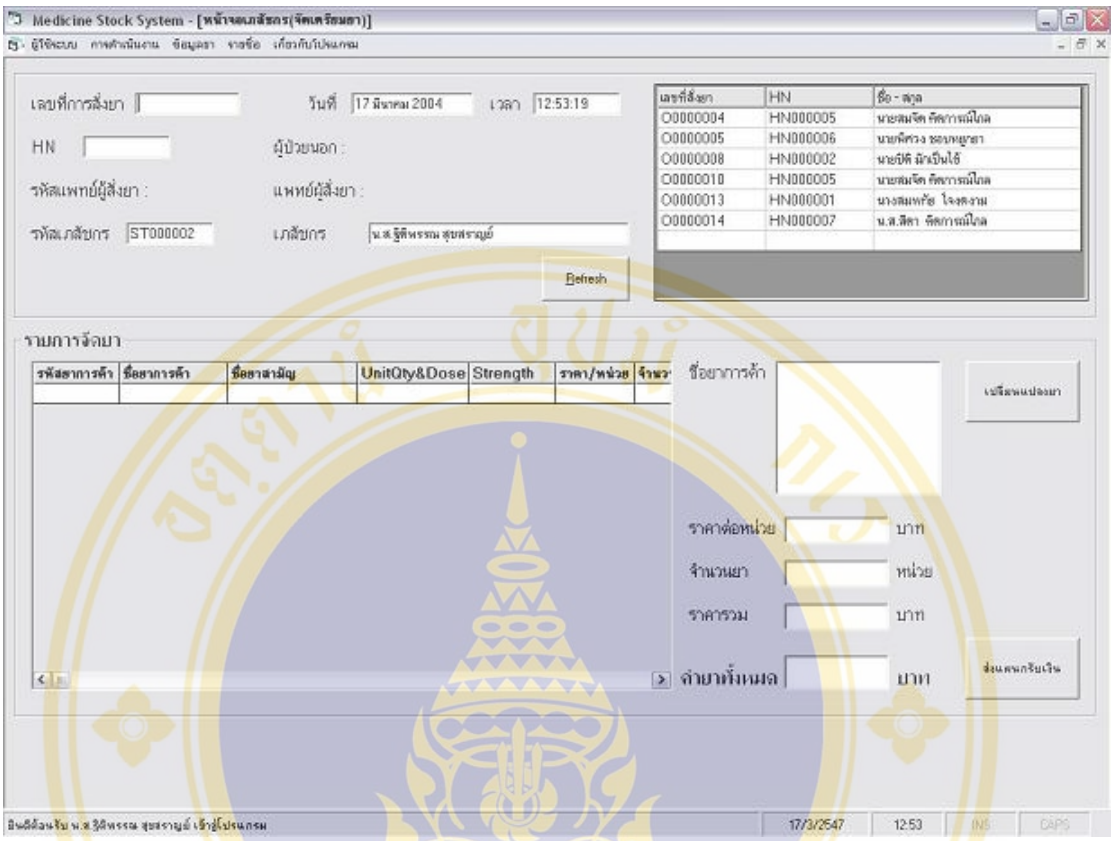


Figure A.12 Show medicine arrangement screen.

7. Medicine dispensation : It is shown when pharmacist of pharmacy department requires to dispense medicine to out patient. It is shown in figure A.13. This screen has the buttons for operation as follows:

7.1 ‘Refresh’ button

It is button for refresh out patient.

7.2 ‘จ่ายยา’ button

It is button for save medicine dispensation to out patient.

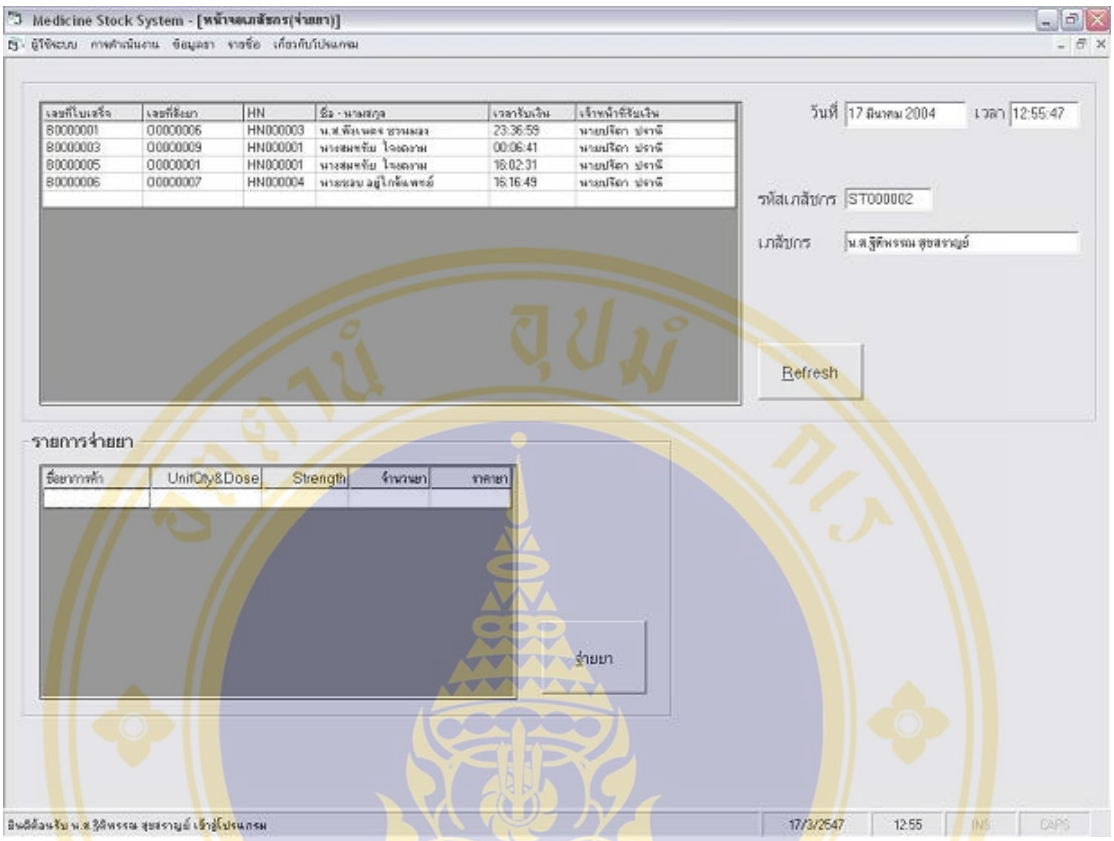


Figure A.13 Show medicine dispensation screen.

8. Payment : It is shown when cashier department requires to receive payment from out-patients by print receipt to it. It is shown in figure A.14 and A.15. This screen has the buttons for operation as follows:

8.1 ‘Refresh’ button

It is button for refresh out patient.

8.2 ‘รับชำระเงิน’ button

It is button for print receipt and save receiving payment from out patient.

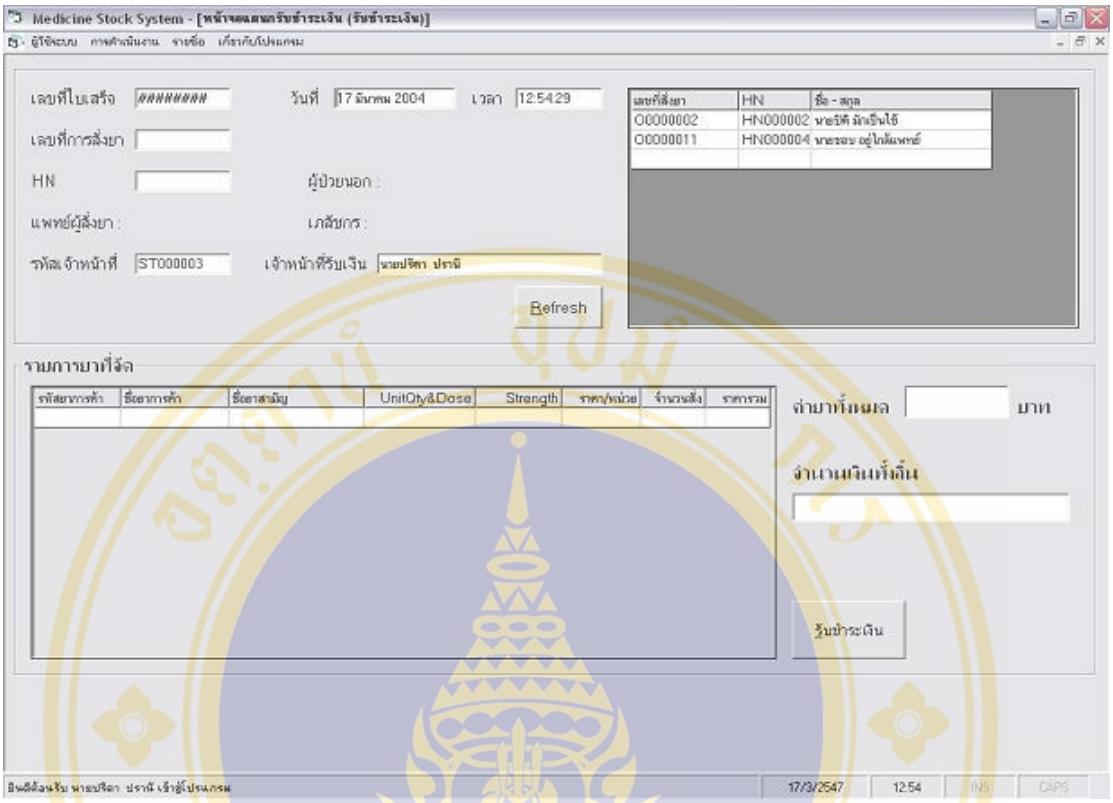


Figure A.14 Show payment receiving screen.

Figure A.15 Show receipt screen.

9.Medicine purchase : It is shown when purchaser of purchase department requires to purchase medicine when the medicine stock system has warning medicine decrease before no enough for dispensation to out patient. It is shown in figure A.16 and A.17. This screen has the buttons for operation as follows:

9.1 'เพิ่มการจัดซื้อ'

It is button for add medicine purchase.

9.2 'ลบการจัดซื้อ'

It is button for cancel medicine purchase.

9.3 'บันทึกการจัดซื้อยา'

It is button for save medicine purchase and print purchase order (PO) for sending medicine purchase to that medicine agency.

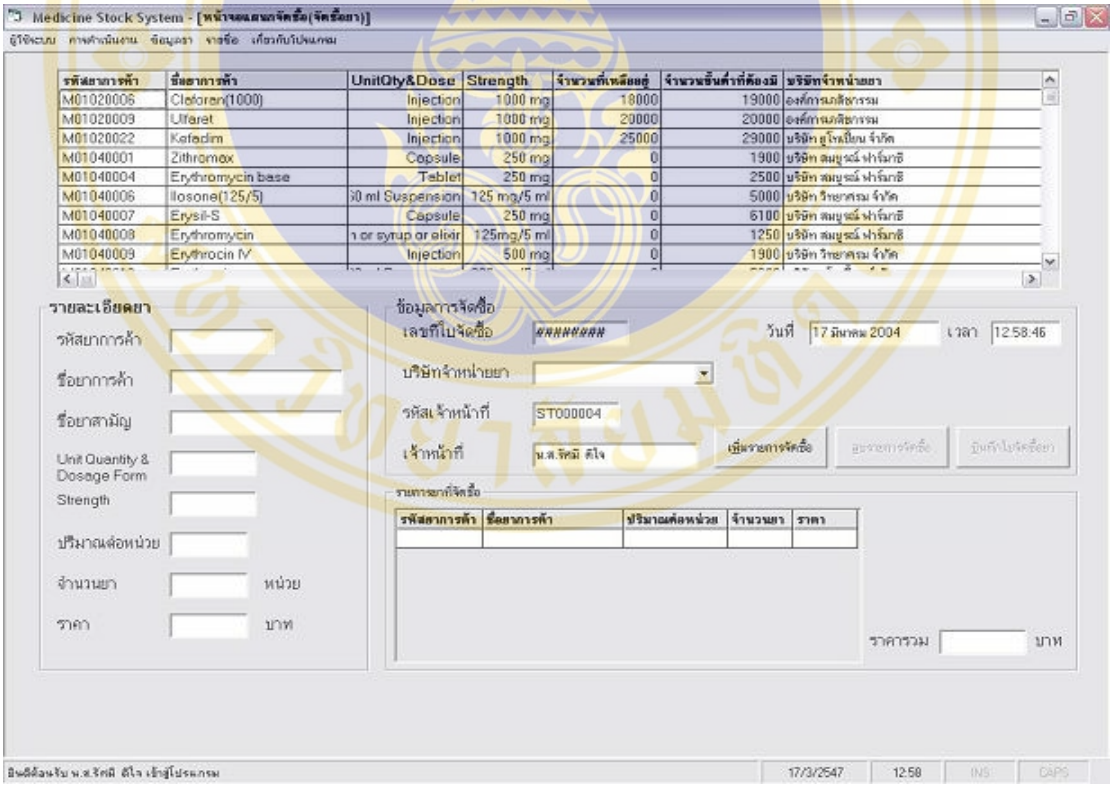


Figure A.16 Show medicine purchase screen.

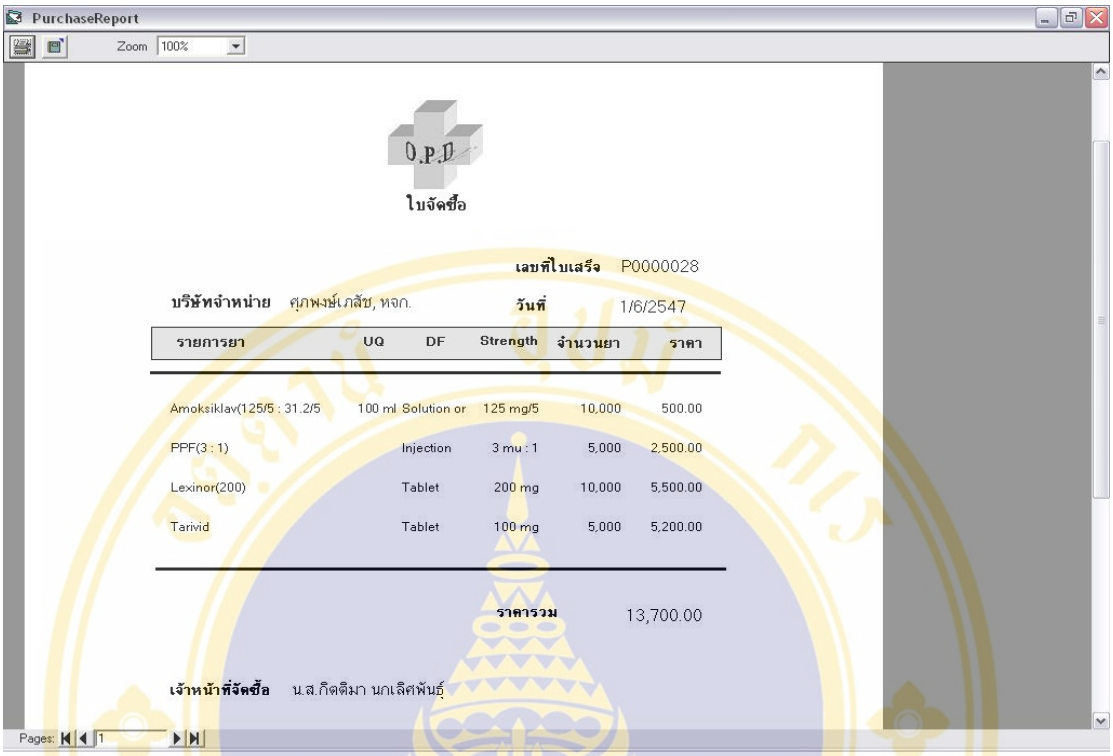


Figure A.17 Show purchase order (PO) screen.

10. Medicine keeping : It is shown when stocker of medicine stock department requires to keep medicine when already receives medicine from medicine agency. It is shown in figure A.18. This screen has only the button for operation as follows:

10.1 ‘ยืนยันการรับยา’

It is button for save amount and price of medicine purchase.

10.2 ‘ไม่ได้รับยานี้’

It is button for delete medicine that is send from medicine agency.

10.3 ‘ Lot ถัดไป’

It is button for fill detail of lot next of medicine that has Lot No. of expiry date more than 1 Lot No..

10.4 ‘ จัดเก็บยา’

It is button for save keeping medicine.

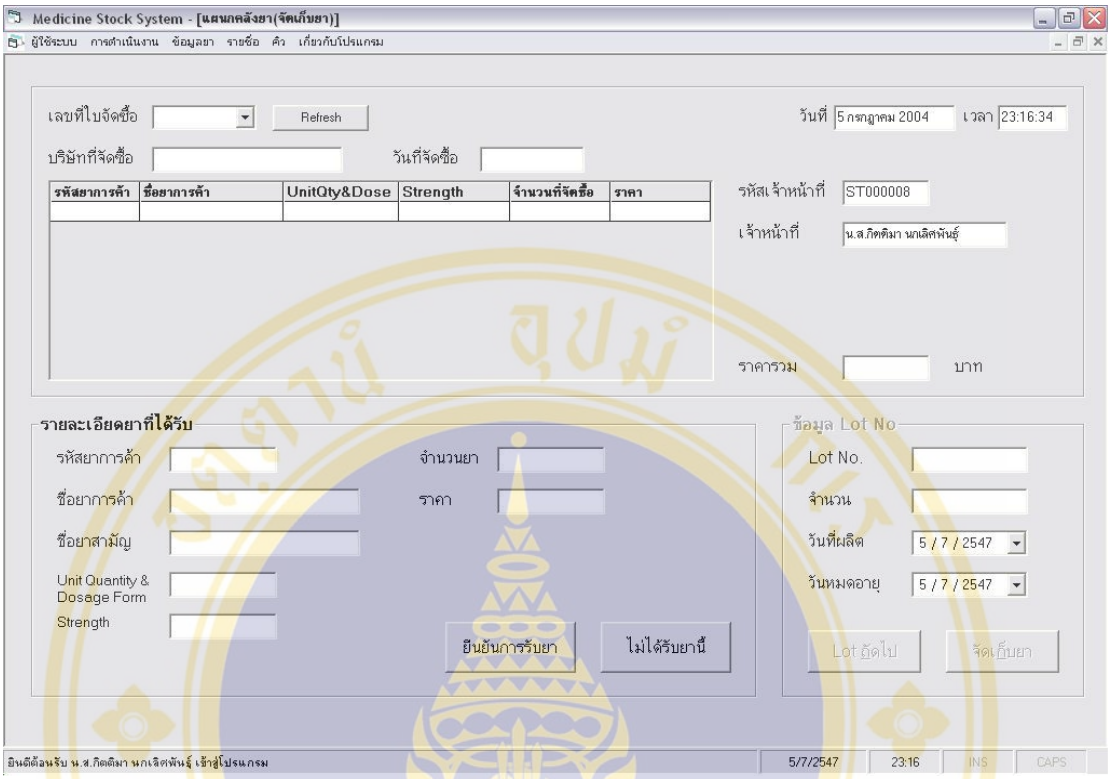


Figure A.18 Show medicine keeping screen.

11. Medicine stock : It is shown when doctor or pharmacist requires to see exist detail of medicine in medicine stock system. It is shown in figure A.19. This screen has only the button for operation as follows:

11.1 ‘รายละเอียด’

It is button for show detail of medicine.

11.2 ‘ปิด’

It is button for close screen of medicine stock.

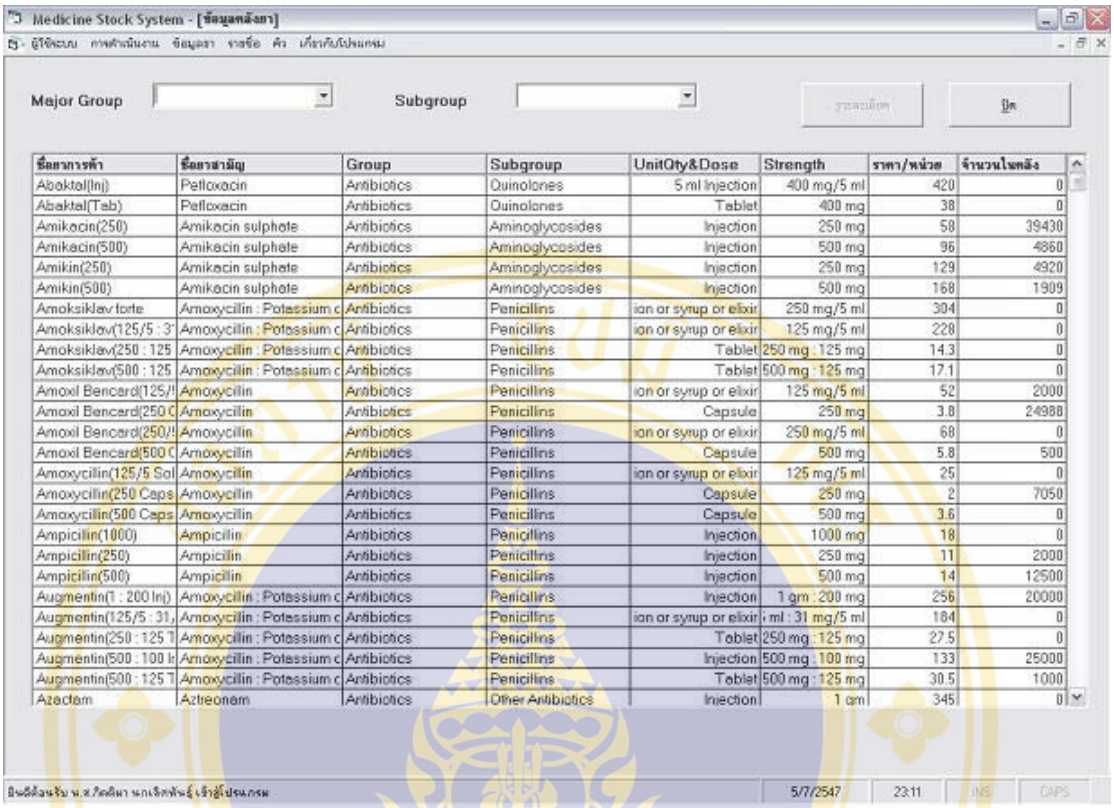


Figure A.19 Show medicine stock screen.

12. Medicine stock management : It is shown when pharmacist requires to manage exist detail of medicine and add medicine in medicine stock system. It is shown in figure A.20 ,A.21, A.22. This screen has only the button for operation as follows:

12.1 ‘เพิ่ม’

It is button for add medicine.

12.2 ‘แก้ไข’

It is button for update medicine.

12.3 ‘บันทึก’

It is button for save medicine when add or update.

12.4 ‘ยกเลิก’

It is button for cancel to add or update medicine.

12.5 ‘…’

It is button of group medicine for add new group.

12.6 '…'

It is button of subgroup medicine for add new subgroup.

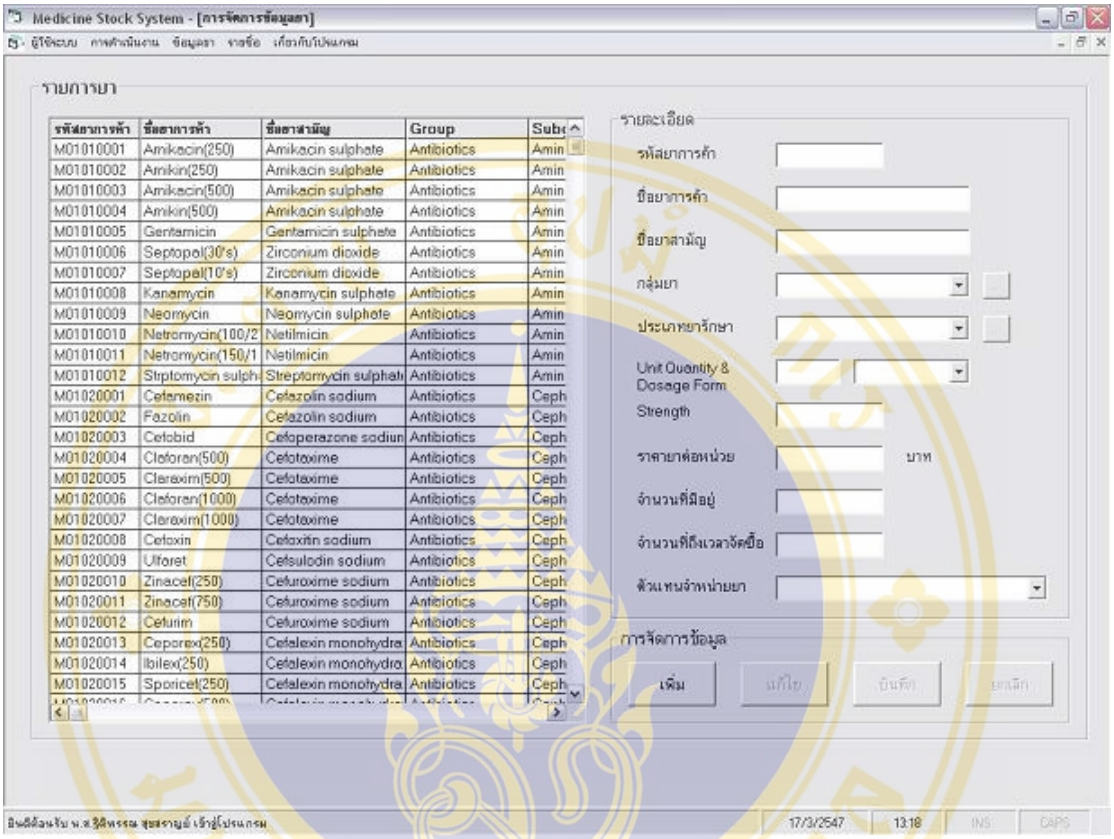


Figure A.20 Show medicine stock management screen.

Figure A.21 Show add group medicine screen.

Figure A.22 Show add subgroup medicine screen.

13. Past purchase : It is shown when purchaser or stocker requires to see past medicine purchase by user specify amount of past month in 3 or 6 or 12 months period. It is shown in figure A.23.This screen has only the button for operation as follows:

13.1 ‘ปิด’

It is button for close past purchase screen.

Figure A.23 Show past purchase screen.

14. Warning expiry medicine : It is shown to pharmacist see suddenly when medicine will be arranged expiry. It is shown in figure A.24. This screen has the buttons for operation as follows:

14.1 ‘ทิ้งยา’

It is button for leave medicine when pharmacist take it already leave from medicine stock.

14.2 ‘ปิด’

It is button for close warning expiry date of medicine screen.

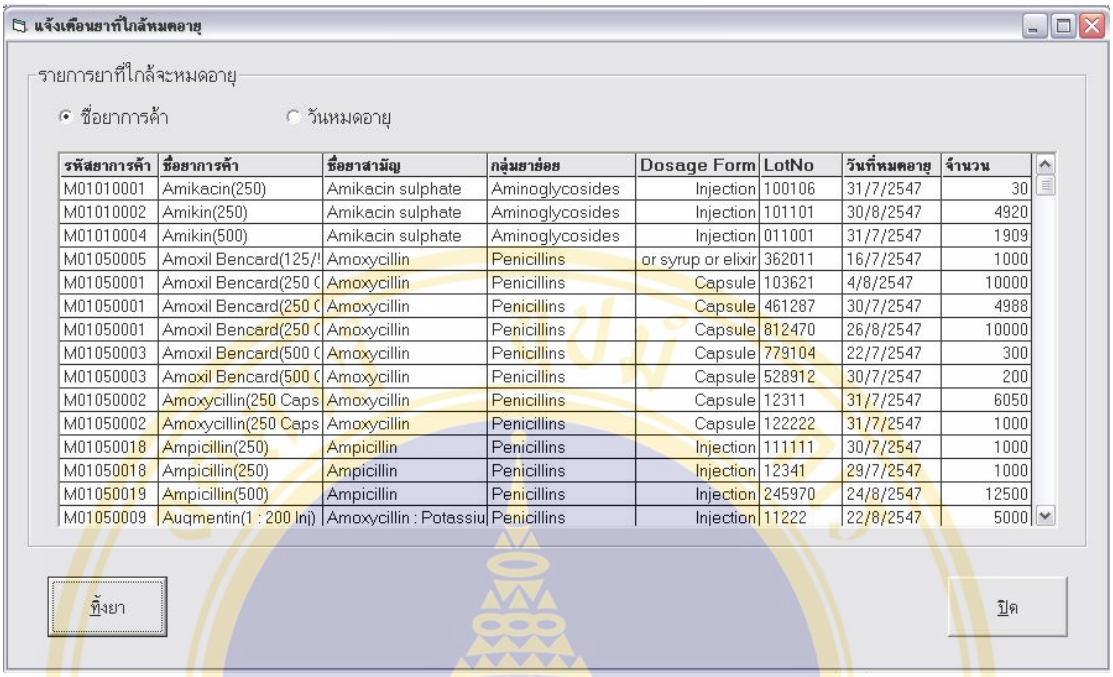


Figure A.24 Show warning expiry date of medicine screen.

15. Out patient's information : It is shown when doctor or pharmacist requires to manage and add out patient's information in medicine stock system. It is shown in figure A.25. This screen has the buttons for operation as follows:

15.1 'เพิ่ม'

It is button for add out patient.

15.2 'แก้ไข'

It is button for update out-patients .

15.3 'บันทึก'

It is button for save out-patients when add or update.

15.4 'ยกเลิก'

It is button for cancel to add or update out patient.

15.5 'First'

It is button for go to the first record of out patient.

15.6 'Back'

It is button for go to the back record of out patient.

15.7 ‘Next’

It is button for go to the next record of out patient.

15.8 ‘Last’

It is button for go to the last record of out patient.

15.9 ‘ปิด’

It is button for close out patient’s information screen.

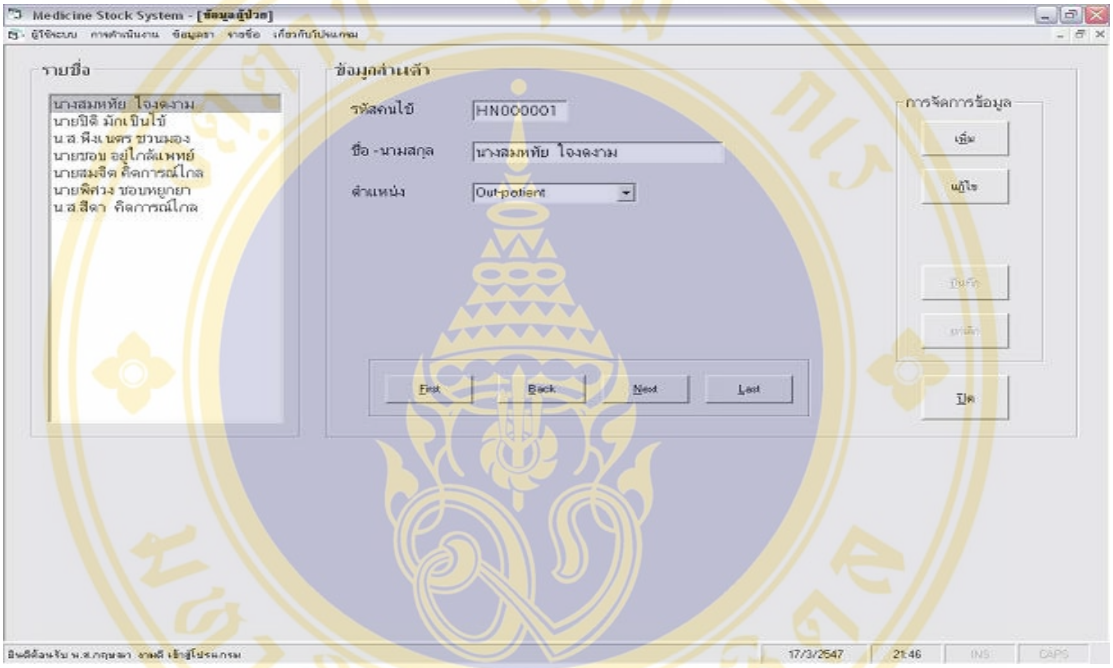


Figure A.25 Show out patient’s information screen.

16. Staff’s information : It is shown when users of 5 departments require to see all staff’s information in medicine stock system. It is shown in figure A.26. This screen has the buttons for operation as follows:

16.1 ‘First’

It is button for go to the first record of staff.

16.2 ‘Back’

It is button for go to the back record of staff.

16.3 ‘Next’

It is button for go to the next record of staff.

16.4 ‘Last’

It is button for go to the last record of staff.

16.5 ‘ปิด’

It is button for close staff’s information screen.

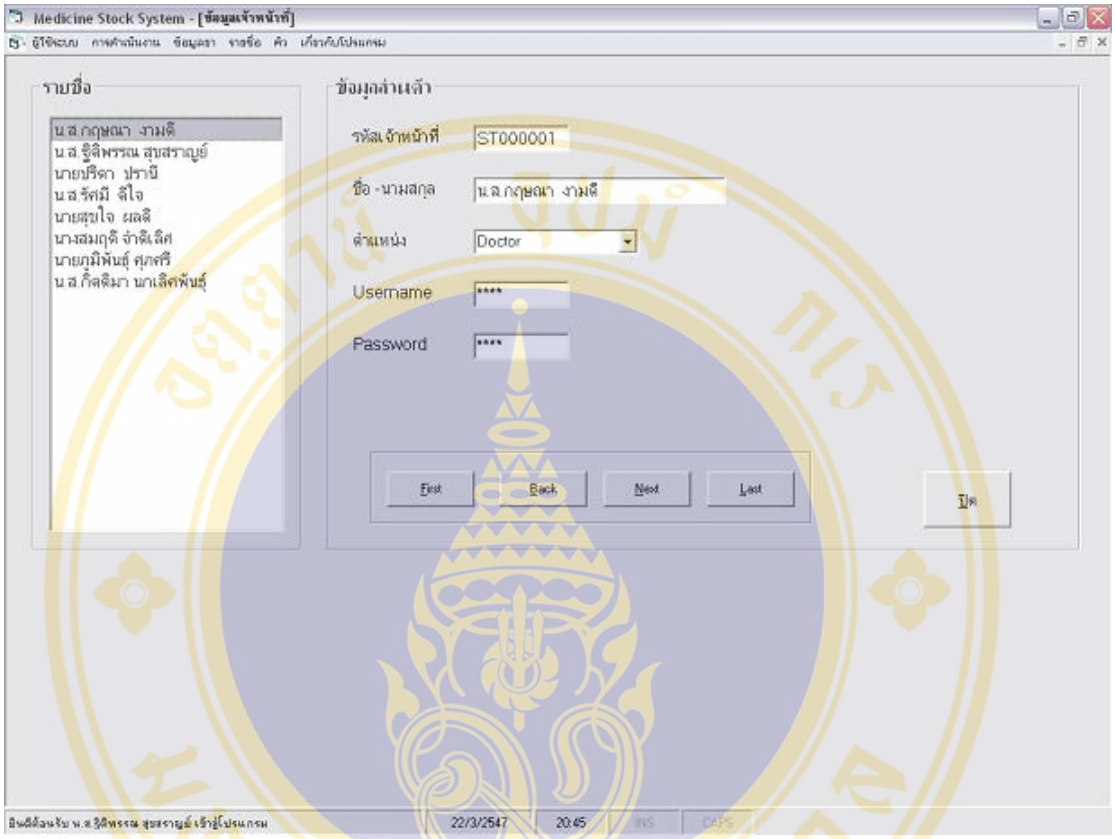


Figure A.26 Show staff’s information screen.

However, system administrators can access to add, update, save, delete users of 5 departments in out-patient department. They see staff’s information screen in figure A.27. This screen has the buttons for their operation as follows:

16.6 ‘เพิ่ม’

It is button for add staff.

16.7 ‘แก้ไข’

It is button for update staff.

16.8 ‘บันทึก’

It is button for save staff when add or update.

16.9 ‘ยกเลิก’

It is button for cancel to add or update staff.

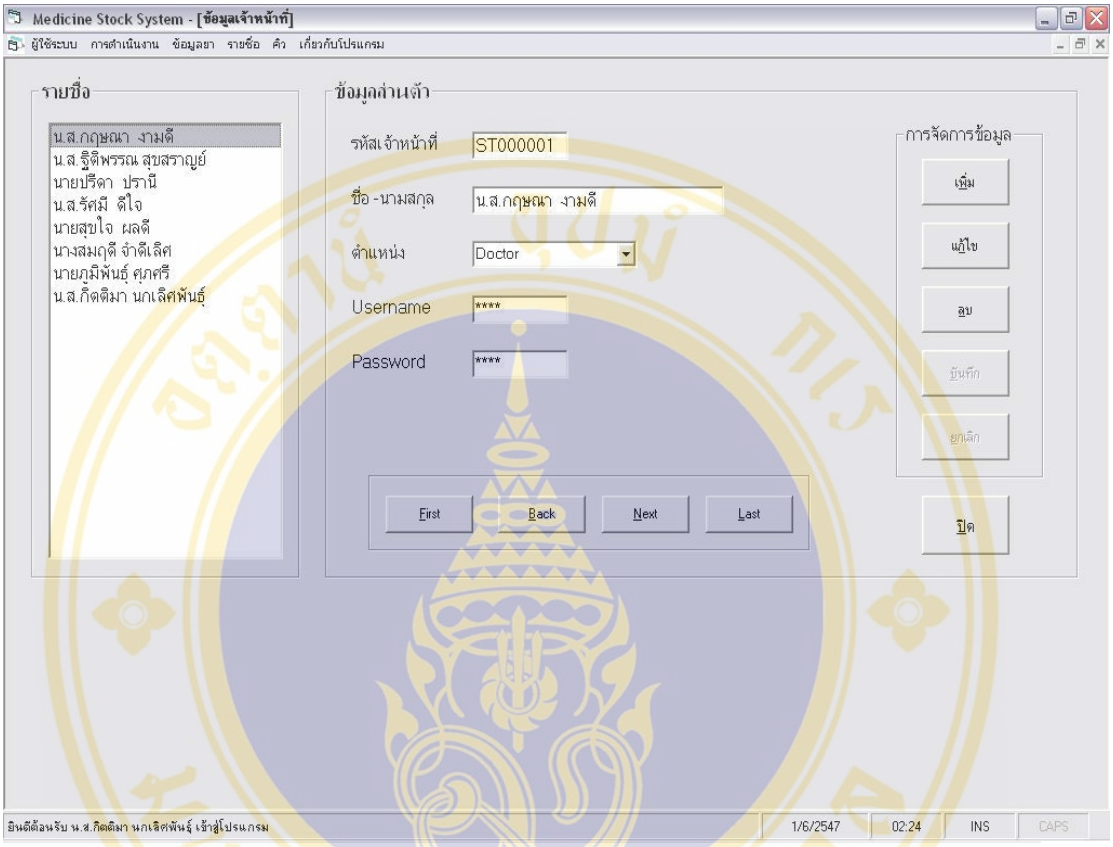


Figure A.27 Show staff's information screen of system administrator.

17. Medicine agency : It is shown when pharmacist or purchaser or stocker requires to manage and add medicine agency 's information in medicine stock system. It is shown in figure A.28. This screen has the buttons for operation as follows:

17.1 'เพิ่ม'

It is button for add medicine agency.

17.2 'แก้ไข'

It is button for update medicine agency.

17.3 'ลบ'

It is button for delete medicine agency.

17.4 'บันทึก'

It is button for save medicine agency when add or update.

17.5 ‘ยกเลิก’

It is button for cancel to add or update medicine agency.

17.6 ‘ปิด’

It is button for close medicine agency’s information screen.

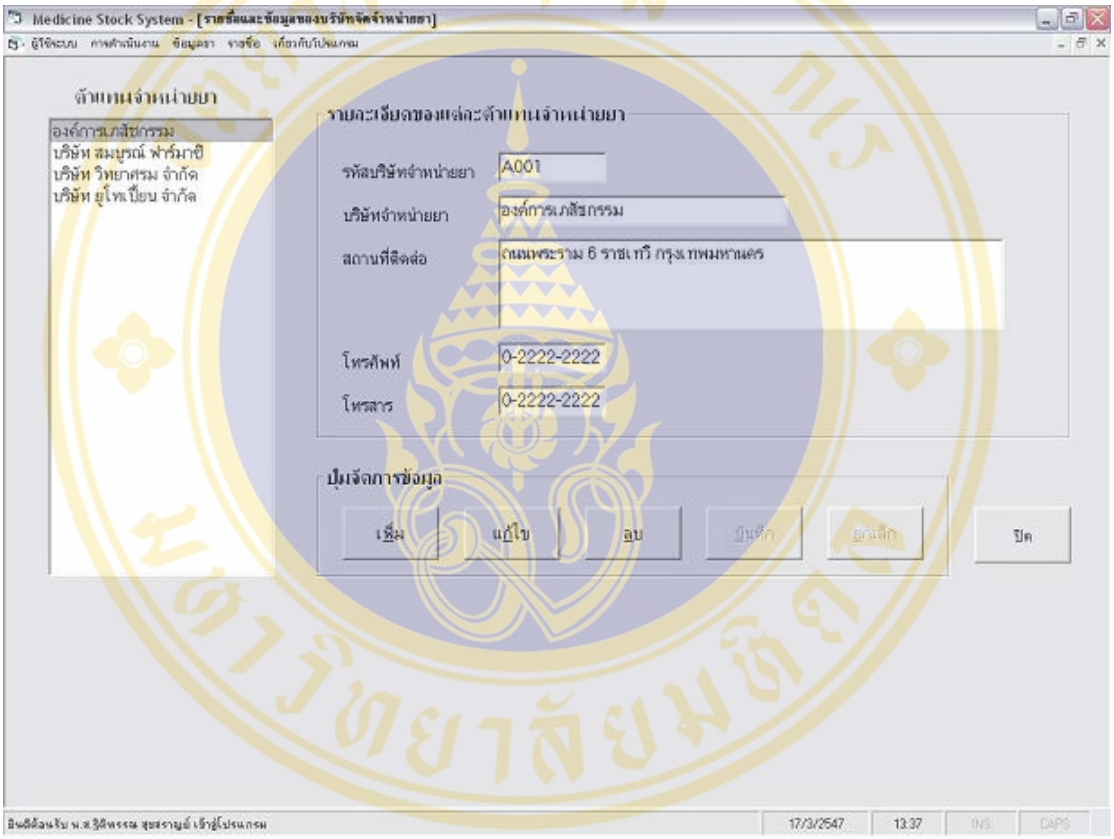


Figure A.28 Show medicine agency’s information screen.

18. Payment queue : It is shown when pharmacist already arrange medicine by display queue of payment of out-patients in cashier department for seeing it. It is shown in figure A.29.

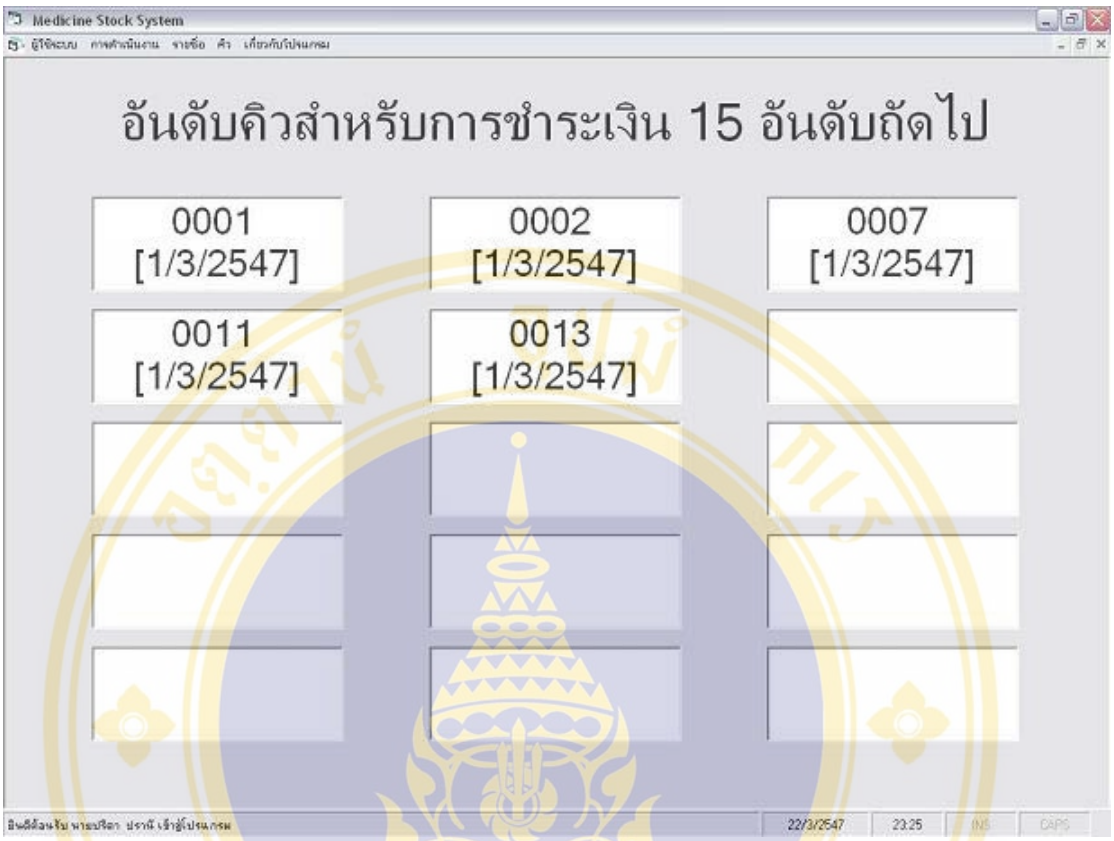


Figure A.29 Show queue of payment screen.

19. Dispense queue : It is shown when cashier already receives payment from out-patients medicine by display queue of dispensation to out-patients in pharmacy department for seeing it. It is shown in figure A.30.

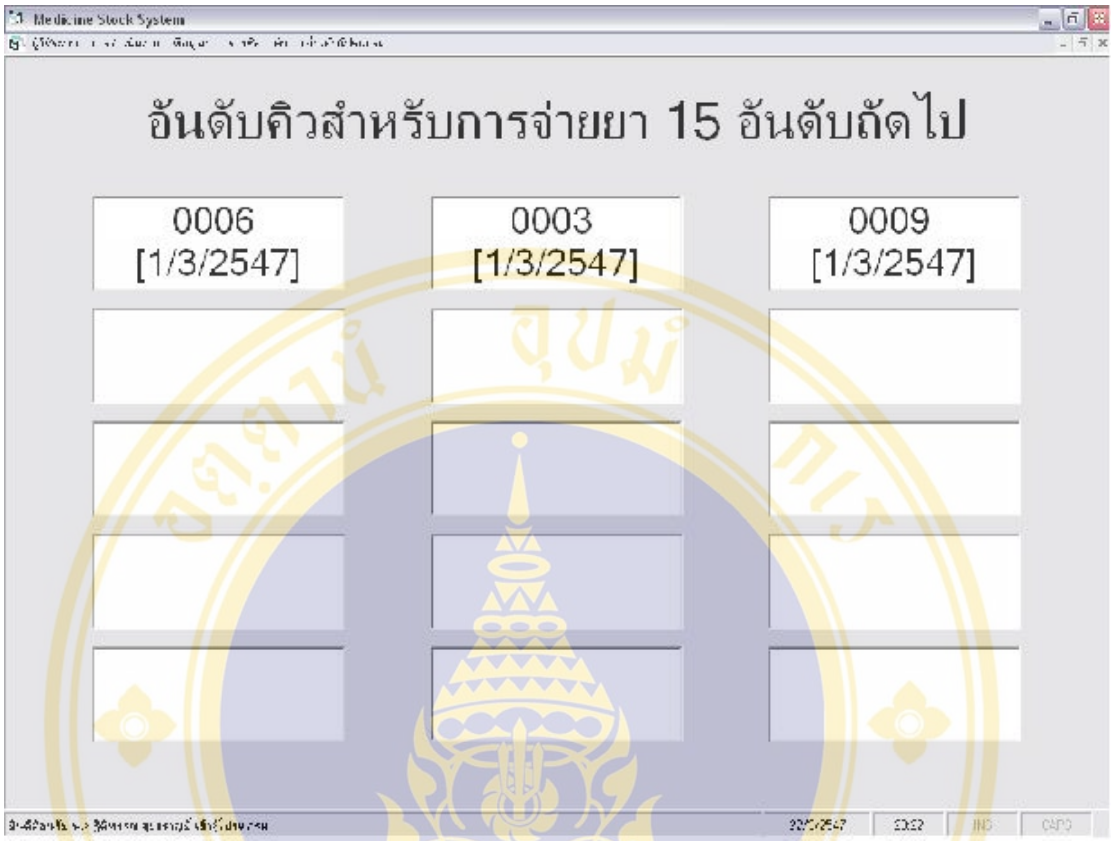


Figure A.30 Show queue of dispensation screen.

20. About program : It is shown when users of 5 departments require to see detail about program. It is shown in figure A.31. This screen has only the button for operation as follows:

20.1 'ปิด'

It is button for close about program screen.

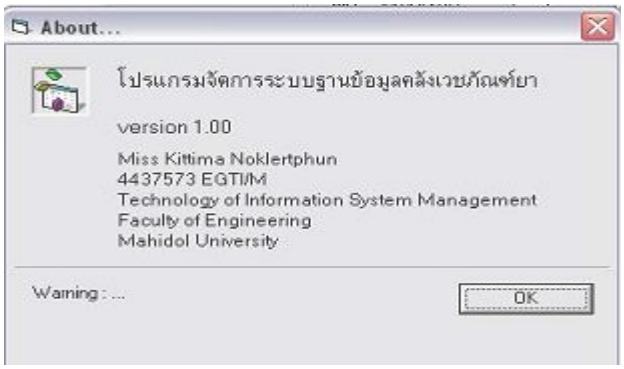
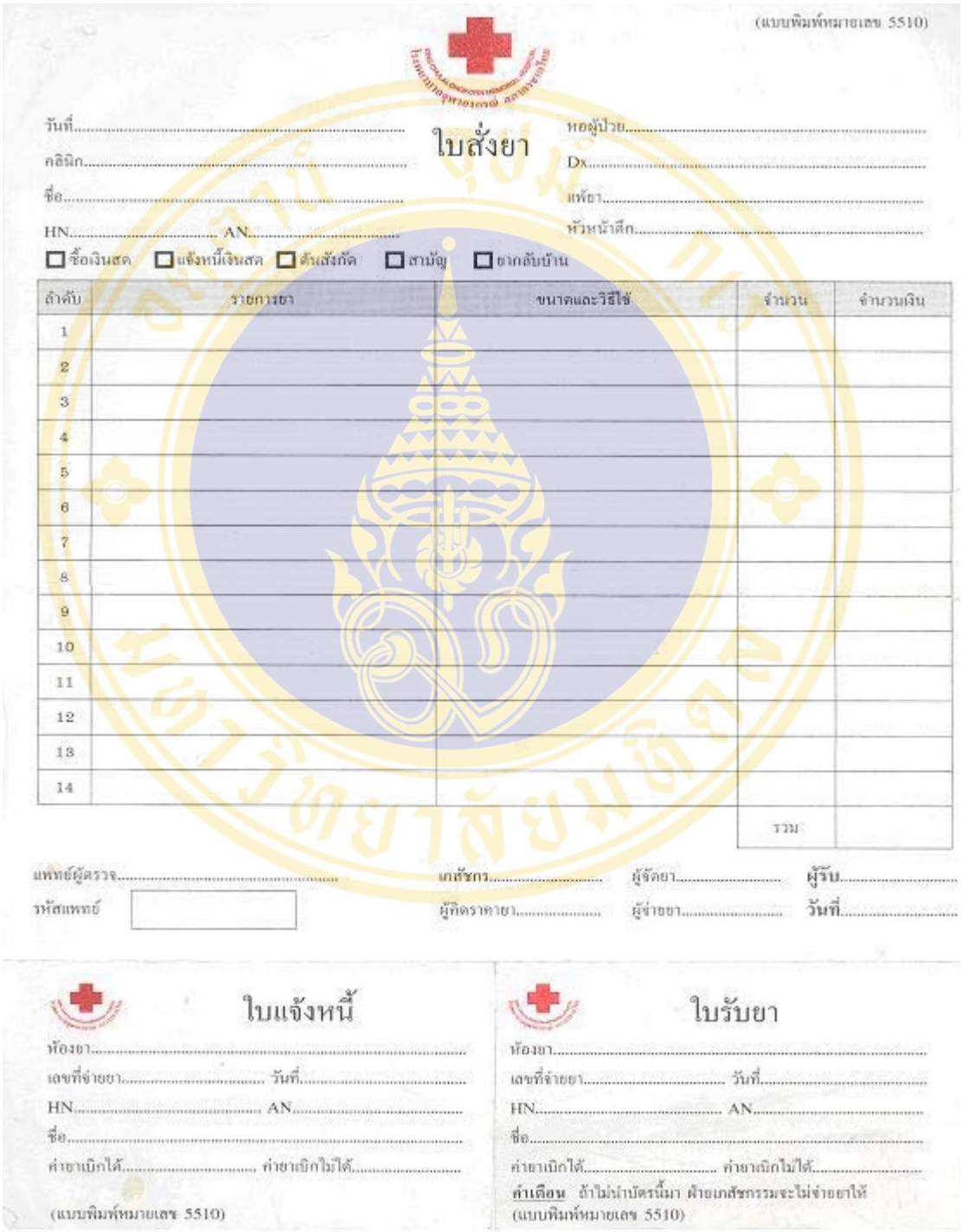


Figure A.31 Show about program screen.

STUDIED DOCUMENT



(แบบพิมพ์หมายเลข 5510)

ใบสั่งยา

วันที่..... หอผู้ป่วย.....
คลินิก..... Dx.....
ชื่อ..... แพ้ยา.....
HN..... AN..... หัวหน้าตึก.....

☐ ซื้อเงินสด ☐ แจ้งหนี้เงินสด ☐ ตั๋วสั่งกัด ☐ สามัญ ☐ ยากลับบ้าน

ลำดับ	รายการยา	ขนาดและวิธีใช้	จำนวน	จำนวนเงิน
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
			รวม	

แพทย์ผู้ตรวจ..... เภสัชกร..... ผู้จัดยา..... ผู้รับ.....
รหัสแพทย์ ผู้คิดราคายา..... ผู้จ่ายยา..... วันที่.....

ใบแจ้งหนี้

ห้องยา.....
เลขที่จ่ายยา..... วันที่.....
HN..... AN.....
ชื่อ.....
ค่ายาเบิกได้..... ค่ายาเบิกไม่ได้.....
(แบบพิมพ์หมายเลข 5510)

ใบรับยา

ห้องยา.....
เลขที่จ่ายยา..... วันที่.....
HN..... AN.....
ชื่อ.....
ค่ายาเบิกได้..... ค่ายาเบิกไม่ได้.....
คำเตือน ถ้าไม่นำบัตรนี้มา ฝ่ายเภสัชกรรมจะไม่จ่ายยาให้
(แบบพิมพ์หมายเลข 5510)

Figure B.1 Show Prescription of A Hospital.

Figure B.2 Show Receipt of A Hospital.

BIOGRAPHY

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