2013

Discounted health insurance premium systems

Krupa Pravin Patel

DISCOUNTED HEALTH INSURANCE PREMIUM SYSTEMS

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Business Administration

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ABSTRACT

Since the early part of the 20th century, the US government continuously tried to reform the healthcare system by providing universal healthcare for all without much success. After much political maneuvering, the Patient Protection and Affordable Care Act (PPACA) (now commonly known as the Affordable Care Act (ACA) or "Obamacare") was passed by the US Congress and signed into law by President Obama on March 21, 2010. The ACA addressed the escalating health care cost issue by creating insurance premium exchanges that aimed at lowering insurance premiums. The focus is on getting large numbers young healthy people, typically between the ages of 27 and 40, to buy inexpensive health insurance in order to help defray the costs of treating fellow citizens who are older or have pre-existing conditions. One problem that arises is that there is no current system that would reward insured people who maintain a healthy lifestyle compared to people who do not. Moreover, there is not a system that provides incentives for individuals who make the effort to adopt a healthy lifestyle after treatment. This project addresses the issue of providing incentives for healthy lifestyles through a Discounted Health Insurance Premium System (DHIPS). DHIPS is a database

driven application that operates similar to automobile insurance. In the automobile insurance industry, bad drivers involved in accidents have their car insurance costs increase, while the good drivers get a discount premium as incentive to maintain safe driving records. In a same fashion DHIPS is a system where the health insured receives the same incentive for maintaining a healthy lifestyle. Therefore a healthy lifestyle person who rarely uses medical services will enjoy low premiums and a person who has an unhealthy lifestyle will pays higher premiums. This will motivate both individuals to maintain or improve their health. The premium will surge or drop based on a percentage set by the insurance companies during the purchase of coverage plan. These percentages will be set by the insurance company based on the age and initial health evaluation of the insured conducted by a physical checkup.

Lastly, the project comes up with a new perspective of securing and protecting health information. Security is addressed in terms of the Chinese stratagems used by Chinese emperors during ancient Chinese wars. Users of the system would learn these strategies in order to provide confidentiality, integrity, and availability of the stored information.

ACKNOWLEDGMENTS

Successful completion of this project required direction and support from many people. I am fortunate to have so many people guiding and assisting me all the way to the end of my project. This research project would not have been possible without their assistance.

First and foremost I wish to express my profound gratitude to my guide Dr. Conrad Shayo for his exemplary guidance, assistance and constant encouragement throughout the period of the project. I also want to express the deep sense of appreciation and regard to Dr. Frank Lin for his cordial support and valuable guidance. I am also grateful for the cooperation and encouragement received by our department chair Dr. Jake Zhu. Their assistance shall carry me a long way on the journey of life on which I am about to embark.

Lastly I would like to thank God for the strength and energy to endure, my loving and caring parents for support, and my husband and friends for their continuous encouragement without which this project would not be possible.

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INTRODUCTION

1.1 Introduction

The United States is the only industrialized country without a universal health insurance system that guarantees coverage to all citizens (Vladeck, 2003). The Congressional Budget Office (CBO) estimates that in 2013, 58 million Americans will remain uninsured (CBO Report, 2013). At the same time, as shown in Figure 1, Healthcare Spending as a Percentage of Gross Domestic Product (GDP) was 17.9% in 2012. This percentage is expected to reach 19.8% by 2020 and 20% by 2021.

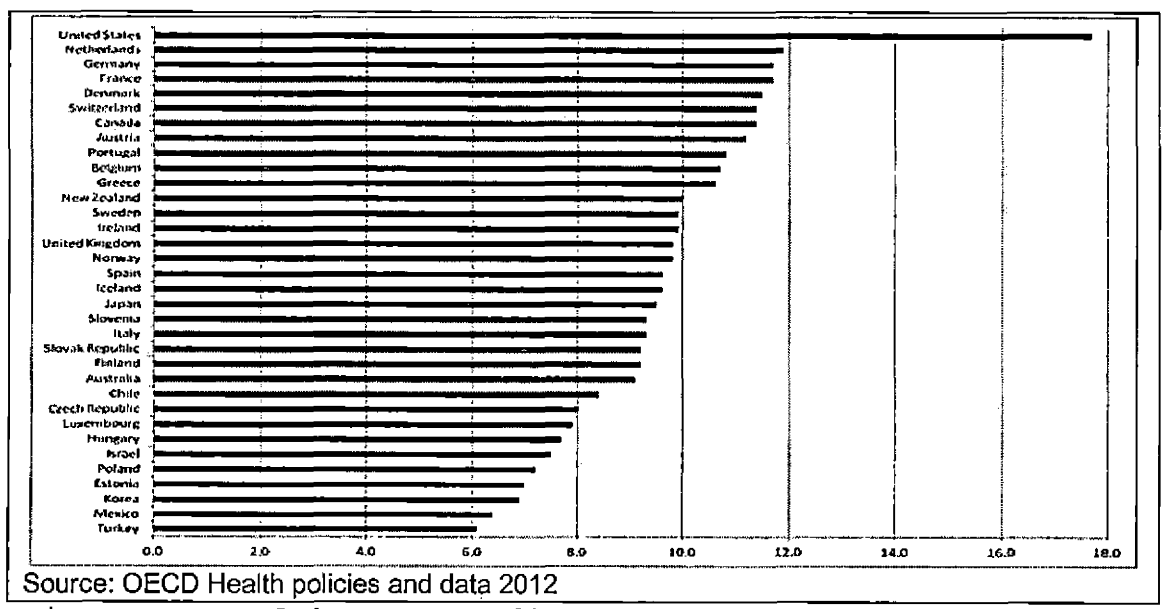


Figure 1. Healthcare Spending as a Percentage of Gross Domestic Product

There are many types of insurance, but the most prominent in the US is health insurance. Insurance is defined in the online dictionary as the assurance or indemnity of the insured by a company to compensate for a specified illness, loss or damage (Dictionary, 2013). Health insurance companies help an insured member cope with risk by compensating the member a sum of money upon the occurrence of a predetermined event, such as a doctor's visit, a medical expense, or a surgical expense. The payment can be made to reimburse the insured or directly to the health care provider. In exchange, the insured pays a constant stream of premiums to the health insurance company.

In general, insurance companies create value by redistributing and pooling several types of risk. Insurance companies collect premiums from their members and then redistribute that premium to the members faced with some sort of crisis where they will need more cash than they have on hand. Since not each member within the pool will actually need compensation, the total use of the redistribution function will lower the total cost of risk management for everyone in the pool.

Insurance is about economies of scale. Since time began, mankind has found safety in numbers. When you sign

up for coverage, you join a group of other people to combine your health care purchasing power. The insurer covers the whole group rather than individuals so everyone shares the cost of staying healthy. Since the cost is now spread out over everyone in the group, when an individual in a group is sick or injured, healthy people in the group help pay this cost knowing that the same help will be there when they need it. Eventually older people in the group begin to use more services. As a result more medical services are consumed and the insurer will have more claims for medical services. Thus the insurance company needs to raise the premium to cover these expenses. Young people may not need to use the medical services as often using fewer services compared to the older people.

There are six principles of insurance that are as follows: (Principles of Insurance, 2011)

1.) Principle of utmost good faith: Both the insurer and insured should trust each other and provide correct and clear information.

2.) Principle of insurable interest: Insured must have the insurable interest in what is insured. In health insurance it refers to health insured.

3.) Principle of indemnity: Indemnity is assurance, guarantee by insurer to put the insured back

into same financial position in which he was immediately prior to the loss.

4.) Principle of contribution: This principle is the consequence of the indemnity. Insured can claim for compensation only up to the extent of the actual loss occurred.

5.) Principle of subrogation: Once the insurer is compensated for the loss, then the ownership of entity passes to insurer.

6.) Principle of loss minimization: It is the duty of the insured to protect or take all possible steps to minimize the loss to insured entity on the happening of uncertain event.

Considering the current health insurance system in the US, is the principle of indemnity really fulfilled? According to an article reported in the New York Times, an "estimated three-quarters of people who are pushed into personal bankruptcy by medical problems actually had insurance when they got sick or were injured" (New York Times, 2009, p. 1). Therefore, the answer is no, because the current health insurance system does not put the insured back into same financial position in which they were immediately prior to the loss.

This is the reason why the number of uninsured Americans is increasing year after year. In 2011, the percentage of the U.S. population without health insurance was 15.7% as can be seen in Figure 2.

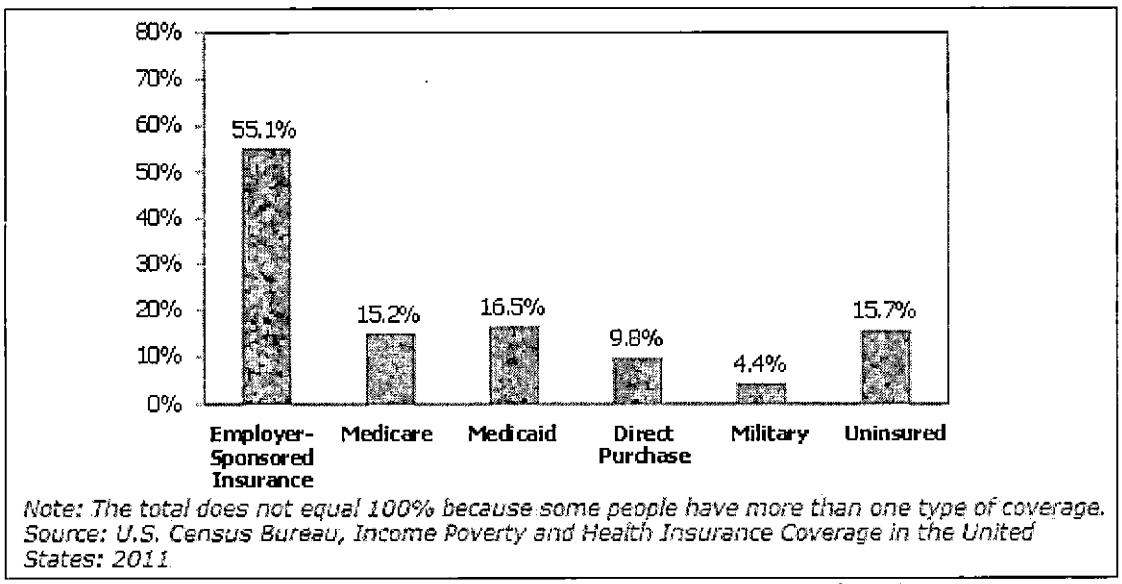


Figure 2. Sources of Insurance Coverage: United States Department of Health and Human Services 2011

In 2012 the percentage of the U.S. population without health insurance increased to 16.3 as shown in Figure 3. In 2012, ten percent (10%) of the US population under age 18 was uninsured as was 29.7% of the population between 18 and 34. After the implementation of the ACA, everyone will be required to get insurance, but the population between the ages of 18 and 34 might not see the benefit of becoming insured as they are, and tend to remain, healthy.

Statistic	Percent Without
Percent of U.S. population without health insurance	16.3 %
Percent of U.S. population younger than 65 without health insurance	18.4 %
Age	
Under 18	10 %
18 to 34	29.7 %
35 to 64	17.8 %
65 +	1.8 %
Sex	
Male	18.4 %
Female	15 %
Race	
White	15.8 %
Black	21 %
Asian	17.2 %
Hispanic	32 %
Income	
Less than $25,000	26.6 %
$25,000 – $49,000	21.4 %
$50,000 – $74,999	16 %
$75,000 +	9.1 %
Person below poverty	31.9 %
Location	
State with lowest percent of noninsured (Massachusetts)	4.4 %
State with highest percent of noninsured (Texas)	26.1 %
Source: U.S. Census Bureau: 2012	

Figure 3. Uninsured Health Care Statistics

It is obvious that young people generally are more fit and have fewer visits to the doctor, but they still need to get insured to cover any accidental situations. Conversely, the population of other age groups needs to see the doctor more often making insurance a more

attractive investment. In the US economy health insurance is the one of the largest issues. Health insurance is made to help people financially from any health issue but the system does have certain loop holes.

The cost of health insurance had risen so much that it is getting harder for people in the US to get coverage. Although in the past few years the cost of health care has risen annually, it has now reached to a point where one has to consider whether these increases in health insurance premiums are worth the cost or not. Therefore, ACA has addressed this issue by creating insurance premium exchanges that will lower the premium by pooling purchasing power.

Several developed countries have implemented a single payer health care system and they have also succeeded in keeping the health care costs low. A single payer health care system is a system in which one entity, usually the government, collects a certain percentage of your income in the form of tax and pays almost all of the bills for your health care. Some of the developed countries that have low cost single payer system include Britain, Canada, Australia, Japan, Italy, France, Germany and New Zealand (List of Countries with Universal Healthcare, 2009). A single payer health care system provides fair and quality

care to everyone. Everyone has access to health care, saves money for administrative costs, and can save money by seeking the care earlier (List of Countries with Universal Healthcare, 2009).

1.1.1 Efforts to Reform the Healthcare System in the USA

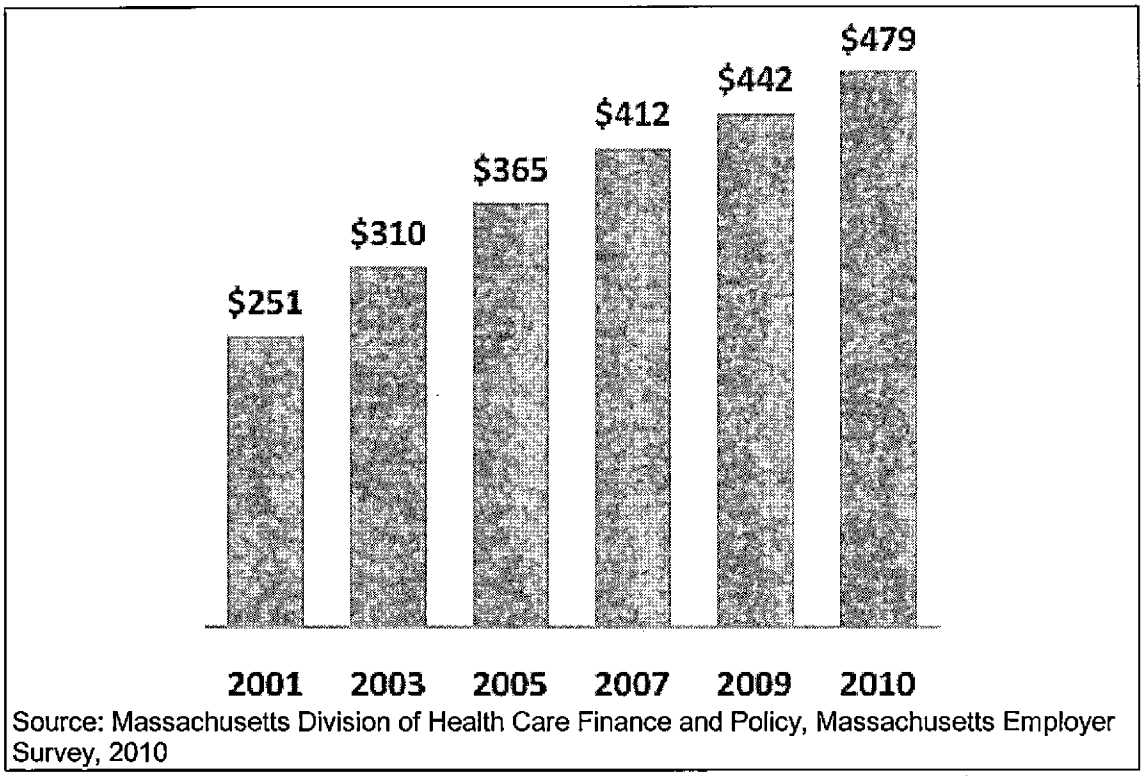
In 2006, Gov. Mitt Romney signed comprehensive health reform, which was designed to provide nearly universal health insurance coverage for the residents of Massachusetts. The health reform efforts promote shared individual, employer, and government responsibility. The Massachusetts health care reform law is informally referred as Romneycare. The law mandates that each resident of Massachusetts should obtain coverage or pay penalty in the form of taxes. And people, who cannot afford to have insurance, get the subsidy from the government. The law was passed with the objective of insuring all the residents of Massachusetts. Results show that the reform did achieve its objective; since 2006 the number of uninsured residents of Massachusetts plunged to about 2% in 2010 (Massachusetts Law about Health Insurance, 2007). A $409 million increase in individual premiums in 2010 compared to 2006 could be alarming during the budget process as shown in Figure 4.

State Program	Actual FY06	Actual FY07	Actual FY08	Estimated FY09	Change FY06-FY09
(a) Commonwealth Care	$0	$133	$628	$800	$800
(b) Uncompensated care for hospitals	$656	$665	$416	$406	−$250
(c) Subtotal (a + b)	$656	$798	$1,044	$1,206	$550
(d) MassHealth coverage rate expansions	$0	$224	$355	$452	$452
(e) Supplemental payments to Medicaid MCOs (federal share)	$385	$0	$0	$0	−$385
(f) Subtotal (d + e)	$385	$224	$355	$452	$67
(g) Supplemental payments to safety net hospitals	$0	$287	$287	$200	$200
Grand total (c + f + g)	$1,041	$1,309	$1,686	$1,858	$817
State share of expenditures (50%)	$521	$655	$843	$929	$409
Annual increase		$134	$189	$86	
Average increase (FY06–09)					$102
Annual percentage change		25.7	28.8	10.2	78.5

Source: Adapted from Raymond (2009: 6, Table 2), which relied on data from Massachusetts state government

Figure 4. Massachusetts: Health Care Reform Spending, FY06–FY09 ($ Millions)

As can be seen in Figure 5, in the State of Massachusetts, Premiums increased from $365 in 2005 to $479 in 2010 whereas as can be seen in Figure 6, employer's contribution to individual coverage also declined from 77% in 2005 to 75% in 2010. Therefore, healthcare coverage for everyone gained the expected results.



Source: Massachusetts Division of Health Care Finance and Policy, Massachusetts Employer Survey, 2010

Figure 5. Median Premium for Individual Coverage in Massachusetts

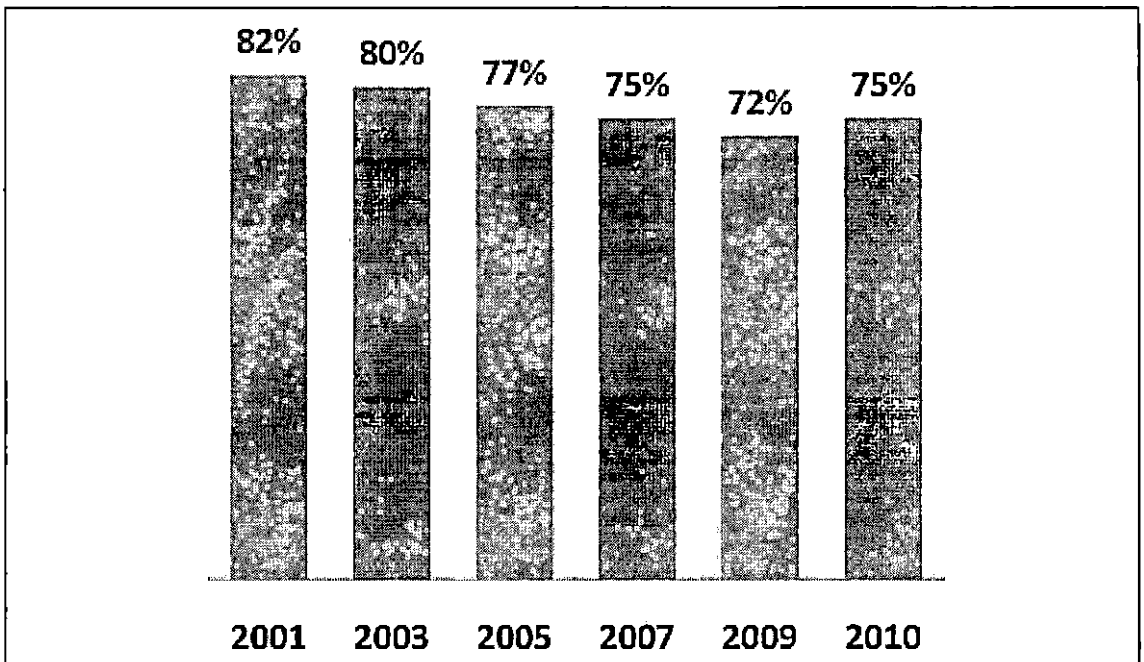


Figure 6. Massachusetts Employer Contribution toward Individual Coverage

Lack of a universal health insurance system was the major impetus for the passage of PPACA (Patient Protection and Affordable Care Act). On March 21st, 2010 US president Barack Obama signed the- Patient Protection and Affordable Care Act - also known as ACA or "Obamacare" into law. Accordingly, laws and regulations by political parties have a tremendous effect on the cost of insurance premiums. Laws in the USA are enacted by both branches of Congress i.e., the Senate and the House of Representatives. The dominant political parties are

Democrats and Republicans. Out of these two parties whoever has a majority in Congress has more leverage. A Democratic majority traditionally focuses on helping people who are in need.

In this project, we propose a discounted health insurance premium system which can be used by the insurance companies and government of the US to keep the rising health care cost low. This discounted health insurance premium system uses IT (Information Technology) solutions to keep the health insurance premium costs low. This will give insurance companies a new way to charge premiums to their customers based on the information collected in the database. Premiums charged will be based on the health of the insured. This project approaches the problem of raising insurance premiums for the US population by providing the database design that will maintain the information about the improvement or regression in patients' health in the hospital. For example, a patient has diabetes and goes for a checkup. His doctor finds that his sugar level has decreased and his diabetes is under control, so from that month his insurance company will decrease his premium up to certain predetermined percentage. Assuming that the same patient goes for another checkup four weeks after this visit and

his doctor finds that he has again lowered his sugar levels since his last check-up, his insurance premium would again be reduced by a certain percentage that is predetermined during the purchase of insurance plan. All this information will be captured in database of the patient's clinic or hospital and will be accessible to insurance companies. Thereby creating a system where insurance companies will charge premiums to their customers based on these medical reports. An insurance premium will function similar to a debit card, which gets debited or credited. Insurance premiums act like a balance in the debit card that keeps on increasing and decreasing according to your health. Premium increases when your health issues increase and accordingly decreases when your health improves.

Additionally, this project also addresses the security issues of the information captured in the systems along with the financial issues of implementing this system.

1.2 Purpose

The main objective of this project is to address the issue of the rising health care in the US, specifically

the issues which will arise after the implementation of Obamacare.

The project provides insurance companies and the US government with an approach to implementing a discounted health insurance system. This system will not only be beneficial to the government and insurance companies in the US but also to the people living in the US. This insurance system will help the people spend less for health insurance premiums by providing them with the discounted premium system. Discounted insurance systems will also motivate people to live longer healthier lives.

Why are health insurance premiums rising so recklessly? Simply put, most people do not consider the cost of health care before embarking on a specific treatment program. When people buy food or nearly any consumable they look at the cost. The same is not true when people visit the doctor. Rarely do they look at how much they are charged for the prescription being filled or how much they will be charged for the surgery or office visit. Why are people exhibiting this irrational spending behavior? The reason is because the insurance company will be paying for their medical treatment.

Since most of us behave that way, health care costs explode with insurance companies making the pricing

decisions for us. Imagine if car insurance paid for your oil changes, would you shop around for oil changes? No, because if someone else is paying, then one would go to the most convenient place and ask for the best service and products available. This same principle applies to health insurance: the more insurance companies charge customers the more the customers will use the health care to get their money's worth. This will lead to the death cycle of health insurance. Since the implementation of Obamacare will increase the coverage by forcing everyone to buy health insurance this problem could get worse because people may be going for unnecessary procedures or to the hospital even when they have a minor illness just to get their money's worth.

Secondly, after implementation of ACA the cost will decrease for the people with preexisting conditions. Obamacare will force health insurance companies to provide coverage to people with preexisting conditions at a lower cost. Insurance companies will likely charge higher premiums from rest of us to cover customers with preexisting conditions.

The insurance companies and hospitals that implement this proposed system and help save money for the US government would be rewarded in the form of rebates and

subsidies. This will encourage the insurance companies and hospitals to help their customers' live a healthy lifestyle.

1.3 Scope

The scope of the project is to develop a discounted health insurance premium system with the help of IT (Information Technology). The aim is to develop a system that will be capable of reducing the cost of health insurance in the US. A discounted premium system will provide the accurate reliable premium rates to the health insurance companies based on the medical reports generated by the hospital or clinic. The information needed in this type of systems will be huge. So to manage such a huge level of information collection and storage, hospitals and insurance companies will require a system that is highly integrated and scalable. The database that will be used by the system needs to be designed well and provide reliable, confidential, and timely information to the insurance companies and hospitals.

The tasks that need to be implemented are:

a. Gather the knowledge about the facts and functionality of US health care systems.

b. Understand how health insurance systems in US work.

c. Collect information about the various amendments and acts which affects the health insurance industries.

d. Learn how databases are designed and how the information will be managed.

e. Understand the flow of information amongst the entities.

f. Gather the information about health care security act HIPPA (Health Insurance Portability and Accountability Act).

g. Collect the information about the PPACA (Patient Protection and Affordable Care Act).

h. Learning the security measures for the information that will provide reliable, confidential, and timely information collected and stored in the systems.

1.4 Significance

1. Discounted insurance premium system will address the economic issue of the health care industry. This system gives the solution to the ever rising cost of health care and health insurance.

2. According to Karen Ignagni, President & CEO, America's Health Insurance Plans, Health Plan Innovations in Delivery System Reforms, American Journal of Managed Care "Health plans are playing a vital role in reducing the cost of care and improving value..." (America's Health Insurance Plans, 2013, P. 1).

3. Percentage of spending on health care has continued to rise each year. Currently more than $1/6^{th}$ of the US economy is dedicated to health care spending and this percentage is still rising. Undesirably, the US health care system is not providing value proportionate with the projected $2.7 trillion spent annually on health care (America's Health Insurance Plans, 2013)

4. Experts in health care industry have also agreed that 20-30 percent of that spending goes to care that is inefficient, redundant and wasteful.

5. Soaring health care costs are punishing our citizens. For the individuals, families, and seniors, the rising cost of medical care results in less money in their pockets and they are forced to make hard choices when balancing

education, food, housing, rent and necessary care.

6. Furthermore, exploding health care costs are also distressing Fortune 500 businesses and small businesses by making it tougher to maintain retiree coverage, more expensive to add new employees and also presenting stiffer completion in the global economy.
7. And finally, for local, state and federal governments, soaring cost of health care leads to high Medicaid and Medicare costs. This results in less funding for other priorities like public safety, education and infrastructure.
8. Therefore discounted health insurance system is specifically developed for the people in US, to help them save money on health insurance cost and also to help them live a longer healthier life.

Let us consider obesity which has been consistently quoted as the foremost health issue in recent decades and also high in terms of spending. Obesity is mostly caused by people eating too much junk food! Obesity rates in the US are among the highest in the world as shown in Figure 7

and the obesity numbers that follow. Not only is a huge amount of health care money spent on obesity but it also costs more on other diseases which rise from the obesity. Several risks of obesity include diabetes, high blood pressure, cancer, breathing difficulties, gallbladder problems, high cholesterol, joint problems, and coronary artery disease (Obesity statistics 2013 of USA, Canada and the world, 2013).

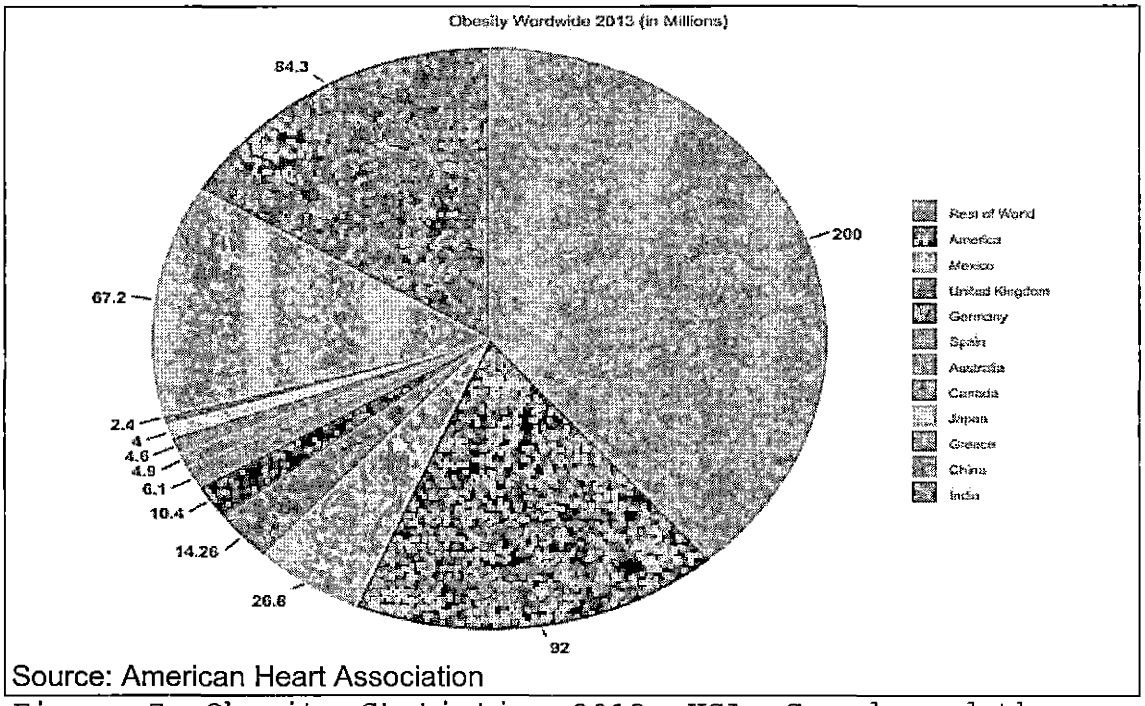


Figure 7. Obesity Statistics 2013: USA, Canada and the World

Obesity in numbers (Obesity Statistics, 2013):

- 520,000,000 Worldwide (2012)
- 92,000,000 Americans (2013)
- 84,388,000 India (2012)
- 67,200,000 China (2011)
- 26,880,000 Mexicans (2013)
- 14,260,000 United Kingdom (2013)
- 10,449,000 Germany (2013)
- 6,192,000 Spain (2013)
- 4,908,000 Australia (2013)
- 4,600,000 Canadians (2011)
- 4,089,000 Japan (2013)
- 2,474,000 Greece (2013)
- 1,592,000 South Korea (2013)
- 1,361,000 Portugal (2013)
- 1,251,000 Solvakia (2013)
- 920,000 New Zealand (2013)
- 689,000 Finland (2013)
- 608,000 Switzerland (2013)
- 582,000 Ireland (2013)
- Overweight in numbers:
- 1,573,000,000 - Worldwide (2012)

- 154,700,0000 - USA (2013)
- 5,600,000 - Canadians (2011)
- United States:
- 66% over 20 are overweight
- 33% over 20 are obese
- $145,645,000 Spent on Weight-Loss (Jan. 1st to May 6th 2013)
- $240,000,000 Spent on Healthcare Stemming from Obesity

This system will not only save money for the Americans but it will also help the government to improve the economy. Health care costs are exploding. After the implementation of ACA each person in US will be forced to buy insurance which will result in increased health insurance premiums by the insurance companies. As the implementation of ACA forces the insurance companies to provide insurance to people with preexisting conditions, insurance companies will charge more premiums from all the insured to cover the cost of people with preexisting conditions. The proposed discounted health insurance premium system is based on the health of the insured. If the person's health improves, their insurance premium will decrease while if their health diminishes their insurance

premium will increase. Hopefully this will motivate all the people in the US to live healthy and happy life.

1.5 Limitations

This project has tried to cover all the areas and address all the issues but due to limitation of time this project might have missed a few areas and these areas can be addressed by a future project. Also this project needs further development in terms of an operational prototype such as developing the actual system along with the network with the coding and designing. Although the project gives the database design, the design needs further development.

In terms of security, project has considered the social engineering techniques and has addressed the issue but future projects should consider the other aspects (like physical security, network security, user training)in much more detail.

1.6 Definitions, Acronyms, and Abbreviations

Following are the terms and definition used in this project.

1. CIA - CIA is a triad that represents Confidentiality, Integrity and Availability. These are the three characteristics of the

secured information. To assure that the information is secured, information needs to fulfill the three characteristics of information (Wikipedia, n.d.).

2. Database - Database is the place where a business or entity stores their information or data for its processes. In database information is organized according to their need in daily work processes (Wikipedia, n.d.).
3. Database design - Database design is the data model for the information which is to be stored. Database design describes logical and physical storage and flow of information in the organization or business. Database design usually provides detail data model for the information which will be required for processing (Wikipedia, n.d.).
4. Discounted - Discounted is deduction in amount of something from its original amount after certain period. It is usually based on the rate that is predetermined during the actual purchase of the plan (Wikipedia, n.d.).
5. Fortune 500 businesses - Fortune 500 businesses are the top 500 US business companies published

in Fortune magazine. Fortune magazine ranks these businesses based on their gross revenue after taxes (Wikipedia, n.d.).

6. Health care - Can also be referred as healthcare. Health care is basically the treatment or prevention of illness, disease or impairment in human beings. It is referred to the care for the wellness of the people in particular country (Wikipedia, n.d.).
7. Health insurance - Health insurance is the coverage to the risk of being sick. It acts as the backup for the risk of incurring medical expense among individuals (Wikipedia, n.d.).
8. HIPPA - HIPPA is the act that was passed by the US government in 1996. Its full form is Health Insurance Portability and Accountability Act. HIPPA was passed to address the privacy issues of the patient's health information. All the organizations in health industry are abided by the HIPPA to protect the privacy of patient's personal information including their health information (Wikipedia, n.d.).
9. Hospitals - Hospitals are basically the institutes which provide health care to the

patients with the specialized equipment and staff (Wikipedia, n.d.).

10. Information security - Information security is sometimes denoted as IS or InfoSec. Information security is protecting the information from the unauthorized access, use, disclosure, modification, or inspection. Basically it is addressing the three characteristics of the information confidentiality, integrity, and availability (Wikipedia, n.d.).
11. Insurance company - Insurance companies are the insurers who provide coverage to the patients. These companies carry the risk of medical expenses for their customers (Wikipedia, n.d.).
12. Insuree - Insuree is the person or entity who is protected by the insurance form the insurance company (Wikipedia, n.d.).
13. IT - It is referred to Information Technology. IT is the application of telecommunicating equipment to store, retrieve, process and manipulate information (Wikipedia, n.d.).
14. Medicaid - Medicaid is the program presented by US government to address the families and individuals with low income. Medicaid is the

source of funding for the health care of the people with low income who cannot afford their health care (Wikipedia, n.d.).

15. Medicare - Medicare is the social insurance program presented by US government which guarantees access to the health insurance to the individuals aged 65 and the people with disability (Wikipedia, n.d.).
16. Patients - Patient is the person who needs the treatment by the physician. Patient is the person who uses the health services and they are ill or injured (Wikipedia, n.d.).
17. PPACA - PPACA is known as Patient Protection and Affordable Care Act. PPACA reform is known as health care for all or single payer health care. Single payer health care is the system where individuals who cannot afford health care can take the PPACA where they have to pay the cost of health care in the form of tax to the government. And it is commonly known as Obamacare (Wikipedia, n.d.).
18. Premium - Premium is basically the rate based on which insurance company charges the amount of money for active coverage (Wikipedia, n.d.).

CHAPTER TWO

CURRENT HEALTH CARE SYSTEM

2.1 Health Insurance Overview

Overview of current health insurance system can be viewed below in Figure 8. Providers are those who provide the medical services to the patients. They are the doctors, nurses, hospitals, and pharmacies. Insurers who pay for medical services are the "payer". Potential patients have to pay the premium to the insurance companies but sometimes, in order to attract good employees, employers subsidizes their employees by co-paying the insurance premium. In other cases people pay taxes and the government pays for medical services. In many cases patients have to pay a co-pay for the doctor's visit.

Over time, the US developed two different types of insurers: HMO and PPO - two versions of insurance. HMO stands for Health Maintenance Organization and PPO stands for Preferred Provider Organization. These are the companies that provide health insurance. Insurance companies try to cover patients care by contracting with the provider. A HMO will have list of doctors that a patient can see for medical services but if the doctor is

not on the HMO list the patient will have to pay for treatment themselves. HMO is a more managed arrangement between insurance companies and doctors who decide on what is allowable. The PPO still has a list of doctors but if the patient decides to see someone outside of the list the health care plan will still pay but not as much as they would if the patient saw someone from the list. Therefore PPO is more flexible.

For people who cannot afford medical insurance, the government has formed two programs which are Medicare and Medicaid. These two governmental programs provide medical services to particular groups of people in the US. Both programs are different and are managed by the Centers of Medicaid and Medicare Services. Medicaid is managed by each individual state where they receive funds from both the federal and state budgets. A person with very low income may be covered through this program. Medicare is administered federally and the payments are made by deductions from a persons' paycheck. It is commonly referred to as single payer health care system and it covers many who are 65 and older as well as others who meet the eligibility criteria.

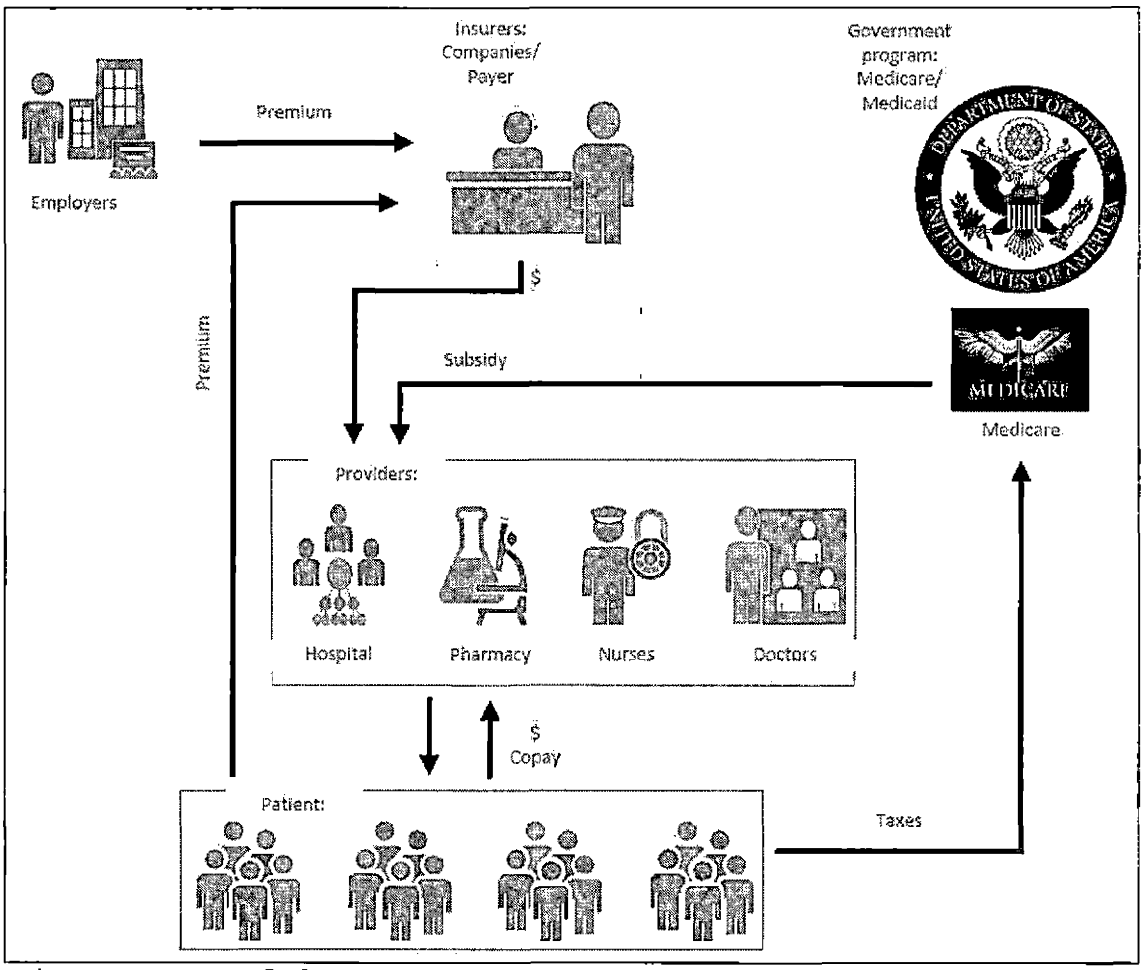


Figure 8. Health Insurance Concepts

2.2 System Architecture

Currently health insurance companies have the client/server architecture. Client/server architecture has several clients interacting with the server over the network. The client side input device can send the request to the server and as the end result server returns the functions such as database access, emails, or web access.

System architecture is shown in Figure 9 which is given below.

The illustration depicts a network for California but the same can be considered for several other states. Data centers are protected with a firewall which is placed in between the network and the intranet. Routers are placed at BDF (distribution layer) and switches are placed at IDF (access layer). Current architecture has three layers top most layer is MDF (Main Distribution Frame), second layer is BDF (Built-in Distribution Frame) and the last is access layer as IDF (Intermediate Distribution Frame). IDF is usually referred as access layer and BDF is referred as distribution layer. Each state can have its own router and data center so they can function without any disruption. The Router that we used is a Cisco 6509 and is placed at BDF level and Cisco 3750 switches are used at each particular location within the state. Therefore switches are used at the IDF (access layer). The topology which is depicted is centralized topology. The protocols shown are 802.11g and 802.11n. And routing protocol used is OSPF (Open Shortest Path First) for most of the part.

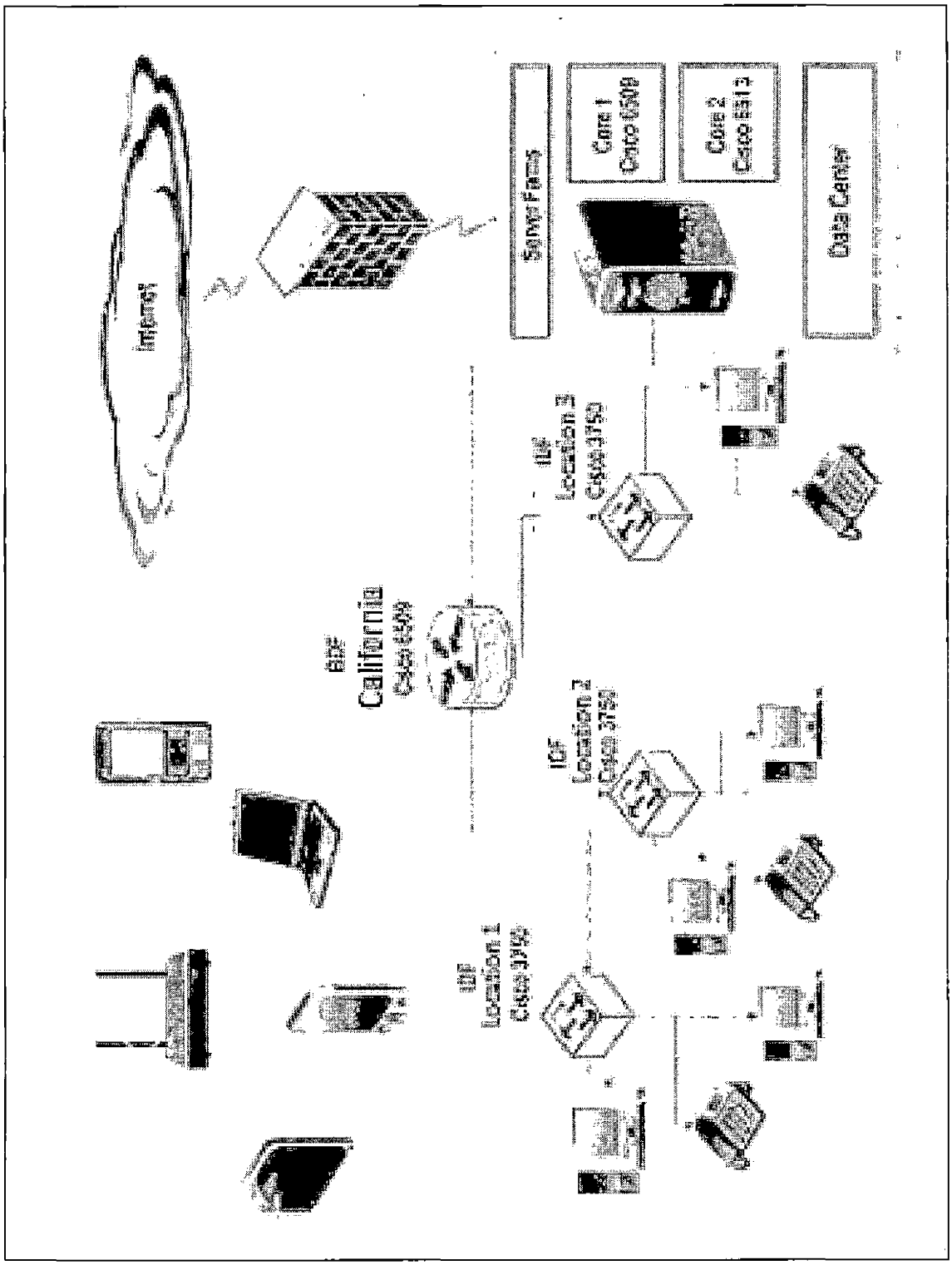


Figure 9. Current System Architecture

Data Center, servers, wireless controllers are also placed in MDF. These Servers are connected to the Core 1 and Core 2. Aruba wireless controllers and blue socket wireless LAN topology check the credentials of the incoming traffic.

At BDF Cisco POE (Power Over Ethernet) switch 6509 is maintained. The POE switch performs the function of both the router, by connecting all the traffic to MDF at the state level, and the switch. A Cisco 6509 POE switch is the switch that acts as a router for the connection to the server.

2.3 Interface Design

2.3.1 System Interface

Currently, health insurance companies have online web application based on a client/server model. A client/server model has the client which uses web browser to access the web application. The client request is sent to the server through the internet. Whenever a client machine sends a request to the server through the web browser over the internet, the web browser interacts with a web server via HTTP protocol. The request is then processed by the web server. The client/server interaction process is shown in Figure 10.

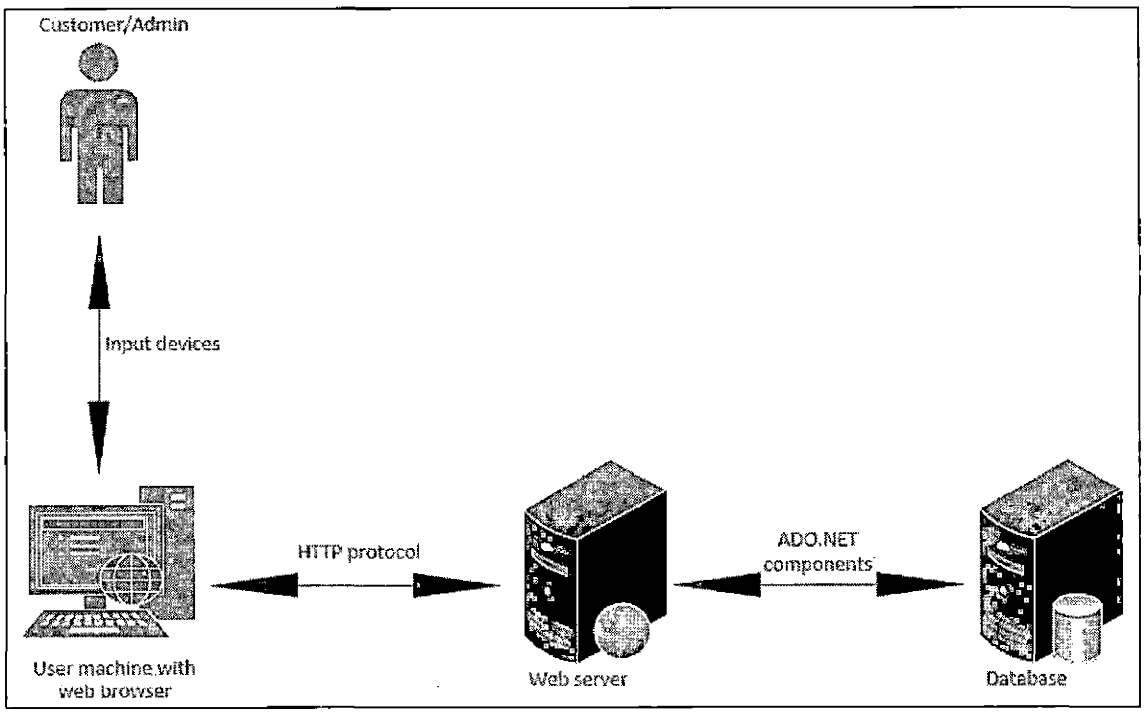


Figure 10. Current System Interfaces

2.3.2 User Interface

The health insurance web application has only two user interfaces: the customer user interface and the admin user interface. The customer user interface does not have a login and password for the guest or new or prospective customers. When a customer wants coverage or wants to get insured the customer will have to register themselves with the company through their web application. Once a customer registers they become a member thereby gaining their own user login and password credentials. The admin user interface already has the login and password credentials to perform their functions independently.

2.3.3 Software Interface

The web application is currently accessed through a web browser over the internet. The application can run on almost all browsers including Google chrome, Internet explorer, Mozilla Firefox, IIS and many more.

2.3.4 Communication Interface

An insurance company uses an asp.net application to interact with the database through ADO.NET. ADO.NET acts as the communication interface in the web application. A client/server model increases efficiency and performance of resources over the network as a client/server model supports the ADO.NET technology. A client/server model addresses several clients over the network, and ADO.NET helps the client/server model to control and manage the traffic over the network.

CHAPTER THREE

PROPOSED HEALTH INSURANCE SYSTEM

3.1 Discounted Health Insurance Premium System

Discounted Health Insurance Premium System (DHIPS) is the application that is driven by the database. The database will be a major module of the system and also will contribute to the overall performance of the system.

Consider automobile insurance. If the insured is involved in an accident, their car insurance costs increases while the good drivers get a premium discount as an incentive to maintain their safe driving records. In a same fashion DHIPS is a system where driver is equated to the patient and health is equated to the car. So now the person will drive their health and can be motivated to maintain or improve their health by providing a premium discount. The premium charged is based on the health of the customers. A healthy person who rarely uses medical services will enjoy the low premiums whereas the person who uses more medical services will have to pay high premiums which will motivate them to improve their health. Each time a person visits the doctor, their health will be measured automatically by the system. According to the

level of healthiness and improvement in their health, their premium would be affected.

The premium will surge or drop based on the percentage set by the insurance companies during the purchase of a coverage plan. These percentages will be set by the insurance company based on the age of the insured person. As an example shown on Table 1, young people will have higher percentages of fluctuation whereas older people will have lower percentages of fluctuations. In general, most would agree that young people need to see doctors less often those who are old. Old people tend to get sick more frequently. Therefore they are a higher insurance risk than young people. Elderly people, due to this higher risk, have a greater need for insurance coverage. Given this higher need, the fluctuation in percentage is less for people as they get older. The table below of is an example which will differ according to situations and circumstances at the time coverage is purchased. Table 1 depicts the Percentages Breaks of Discounted Health Insurance Premium System.

Table 1. Percentage Breaks of Discounted Health Insurance Premium System

Age Group	Percentage Change
0 - 18	15
19 - 40	15
41 - 65	10
66 - above	5

People under forty have the highest rate of fluctuation because it is during this period when we get molded for the good habits of creating a healthy lifestyle. It is important to realize the value of a healthy life when we are young so as we grow older we maintain the same standard of living. Consequently, we have set high rate of fifteen percent for those age groups. For those within the age group of forty-one to sixty-five tend to have certain health conditions that need to be treated or monitored therefore their rate is ten percent. People within the age group of sixty-five and above will be visiting doctors more therefore their rate is set low at five percent.

3.2 System Architecture

The discounted health insurance premium system is an application based on Database Management Systems (DBMS). The discounted health insurance system will have a database server, a web server and connectivity with the Internet. Insurance agents, patients, and employers will access their information regarding insurance premium and payments through the web application via HTTPS. HTTPS protocol is used to access the web due to security concerns.

The function of this web application will be to send the notification email with the help of SMTP protocol. The web application will manage all this information by accessing an Oracle database. iPlanet web server, Oracle database, and Google SMTP server is used to ensure that the system is standardized and reliable. As default, the Google Chrome browser is recommended for the application.

To address the security aspects of the network architecture there is a demilitarized zone which will have all the users running from behind the firewall which is connected to a public network such as the Internet. A few computers will run on the other side of the firewall in the DMZ. These computers in the DMZ will provide an extra layer of protection for the computers that are residing

behind the firewall. Traffic from both directions will be monitored by the firewalls which are placed before and after demilitarized zone. This architecture will have two internal and external networks. Also there are two routers, one in the DMZ and one behind the DMZ. The internal network has users with their own servers and applications to enhance the security of the internal network. The System Architecture Diagram is shown in Figure 11.

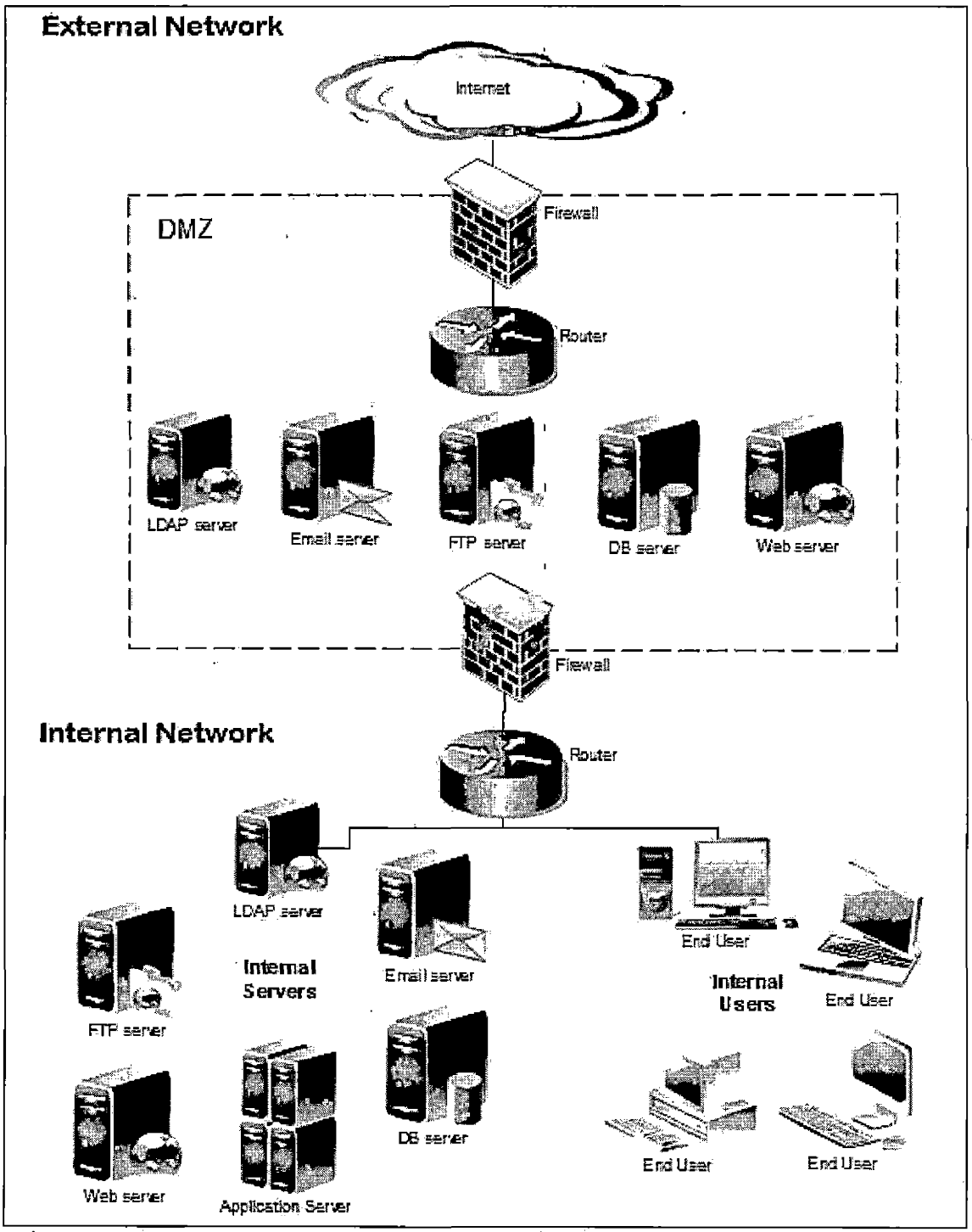


Figure 11. System Architecture Diagram

3.2.1 Hardware Interfaces

The discounted health insurance premium system is a completely cloud based database management system making the system independent of any hardware system. To control the hardware interface, the discounted premium system trusts all the underlying hardware or operating systems like Linux, UNIX, Microsoft Windows, Macintosh, FreeBSD … etc.

3.2.2 Software Interfaces

The software interfaces that can be used to implement this system are:

- Languages: PL/SQL, JAVA, JSP, JavaScript, HTML.
- Operating system: Microsoft Windows 7 professional with Service Pack 1. Microsoft Windows is the most renowned and extensively used operating system in the world. Any operating system and hardware system can be used as discounted health insurance premium system is independent from any hardware and operating system but it is important that patients who are not acquainted with complex computer systems can also use computers.
- Platform: JAVA 2 Platform, Enterprise Edition. Java Platform, Enterprise Edition (J2EE) offers

an Application Programming Interface (API) and runtime environment for developing and running multi-tiered, large scale, secure and reliable network applications. On the top of it Java EE is built on the top of the Java SE platform so it has plenty of powerful features.

- Web Server: Oracle iPlanet Web Server 7.0.15 container. iPlanet is web application container based on java and involved in running Java Server Pages (JSP) and Java servlet. Once the Java servlet is loaded into the Java Virtual Machine (JVM), JVM generates the instance of the class that belongs to the servlet. Then after the JVM will the request to this servlet once the servlet is initialized. The procedures involved in the working of servlet are similar to the procedures involved in the working of JSP. The only difference is that the JSP will be transformed into JSP first.
- Database Server: Oracle 12c can be used for database services. Oracle 12c offers a broad portfolio of software and hardware products and services to enable public and private clouds. 12c automates processes and provides cost

effective storage management. 12c will also maximize the utilization of tiered storage resources for all the enterprise databases. Finally it will minimize the cost of compressing data and I/O operations. With the functionality of maximum availability architecture downtime can reduce costs from all common causes of planned and unplanned downtime including errors. 12c is a complete, advanced inbuilt database analytics that will introduce new integration, provide cost effective platform for business intelligence applications, performance, scalability and capabilities that support's big data and data warehouses.

- Java Database Connector (JDBC): Oracle can provide connectivity for the applications that are developed in the Java programming language with the help of JDBC driver.

3.2.3 User Interfaces

Users interface have been categorized as follow:

1. General User Module
2. Customer/Member Module
3. Agent Module
4. Adminstrator Module

The general user module includes a login page which will have to the option to create an account will provide access to the user. The customer/member and admin modules will also have login page for user validation and access level is granted based on the credentials.

3.3 System Implementation

Prototype system for this project is implemented using Microsoft Access 2010. But other database designing tools can surely be used. Attributes, properties, and types can be viewed in Appendix B attached at the end of the project. Based on the attributes and types the system was implemented and relationships were developed. In Figure 12 below the relationship between all the tables can be seen.

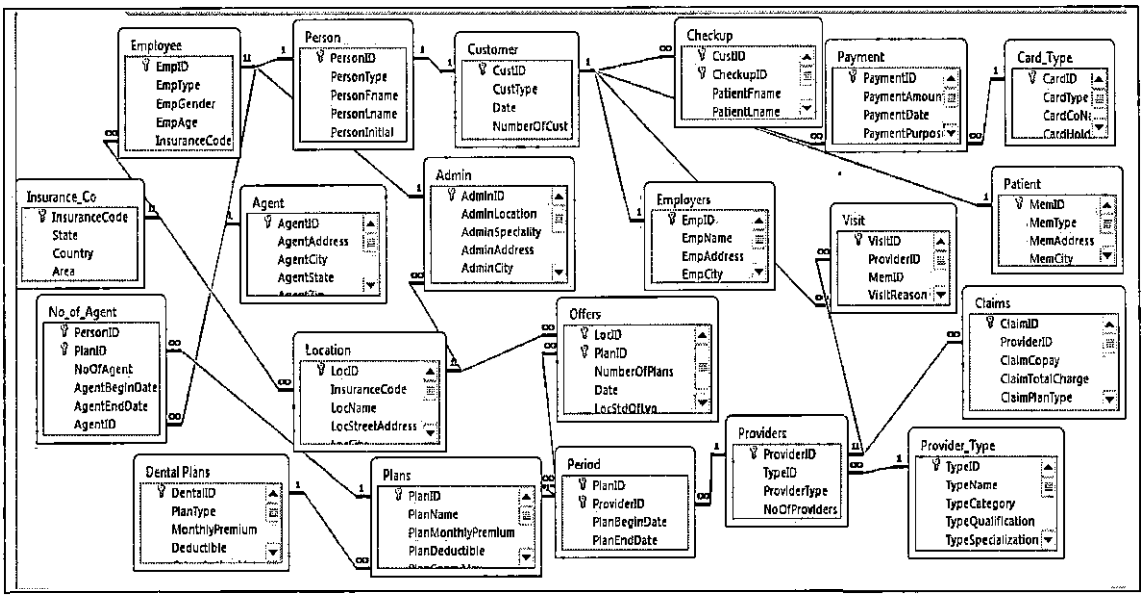


Figure 12. Cardinalities between the Tables

Figure 13 shows the actual view of Discounted Premium prototype system. This menu allows the user of the system to navigate to the Forms, Reports and Queries menus. To test the functionality of the prototype system a few records were entered.

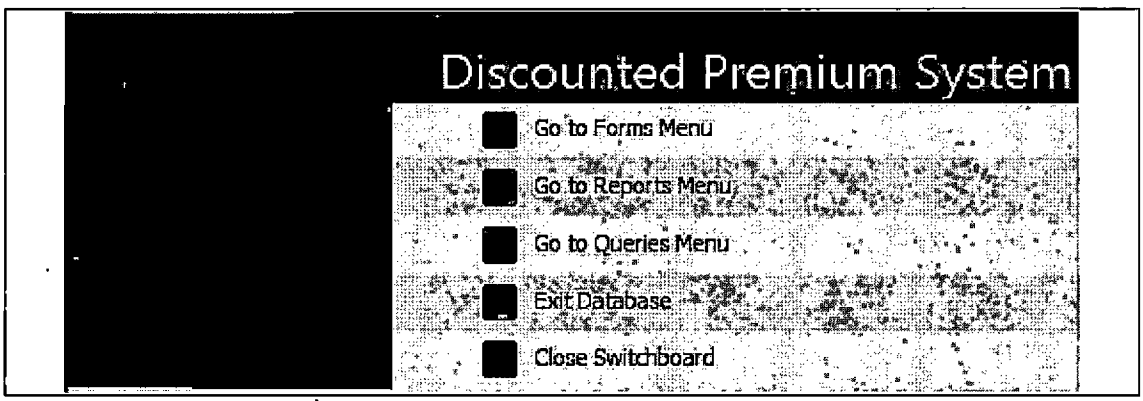


Figure 13. Menu/Switchboard

Figure 14 shows different forms under the forms menu. These forms allow the user to retrieve the information pertaining to specific criteria.

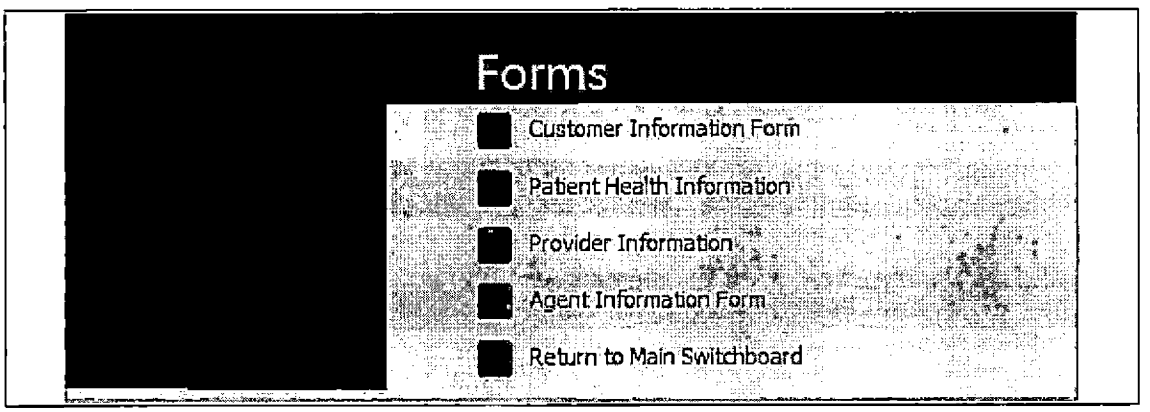


Figure 14. Forms Menu

Below are a few forms and reports from the system which was implemented. The forms and reports given below will help the users to interact and input the information into the system and provide decision makers information to make reliable and faster decisions. The form has the fields and a button to submit the information in to the database (See Figure 15).

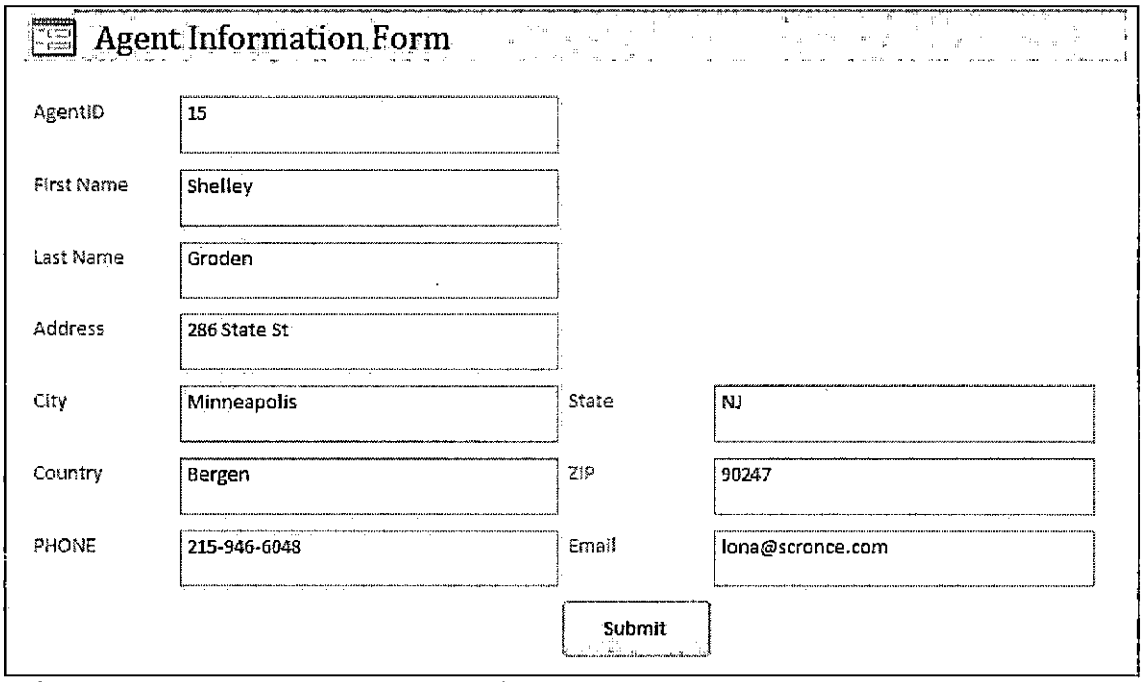


Figure 15. Agent Information Form

Financial information of the patients and insured members is added to the system by the users with the help of the form given in Figure 16.

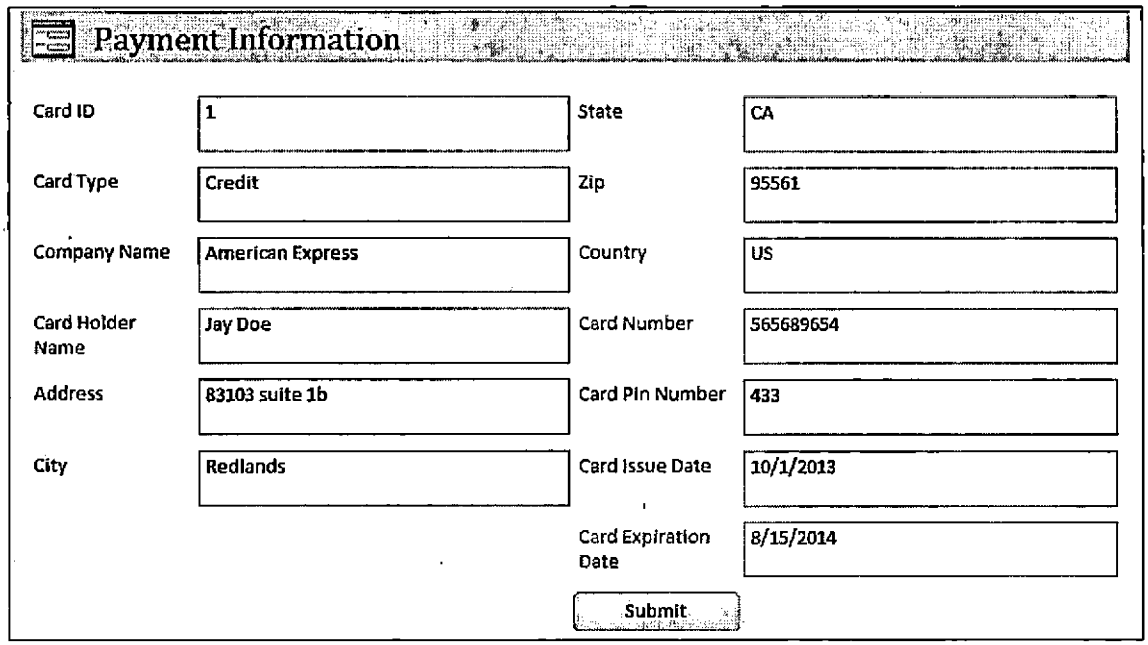


Figure 16. Payment Information Form

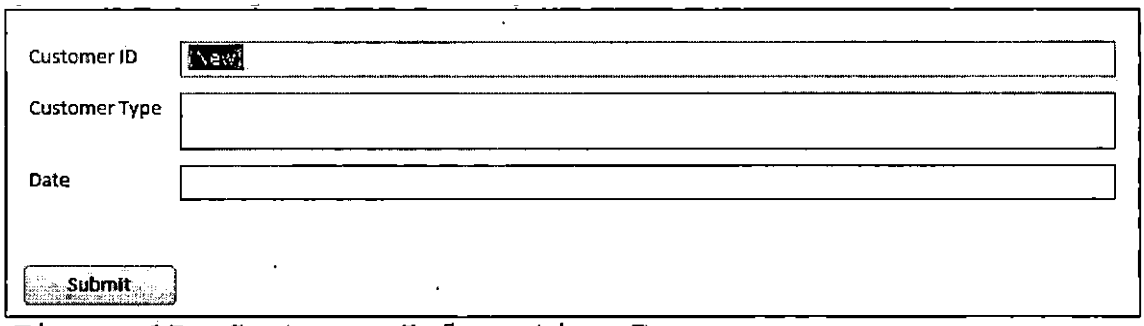


Figure 17. Customer Information Form

Figure 18 shows the patient health information form. This form will be used by the medical service providers after the patient has used the medical services. The

providers will upload the health status of the patient on which insurance companies will base the premium rate to their customers.

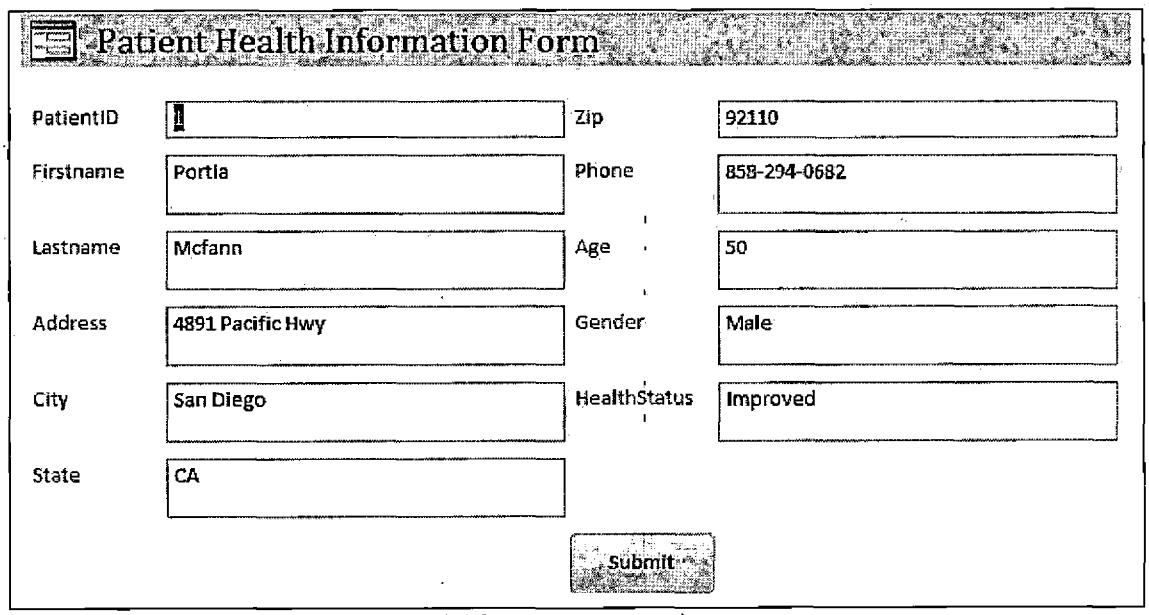


Figure 18. Patient Health Information Form

Figure 19 shows the Patient Health and Premium Information Form from the prototype system. Patient health information can be entered manually through this form into the database.

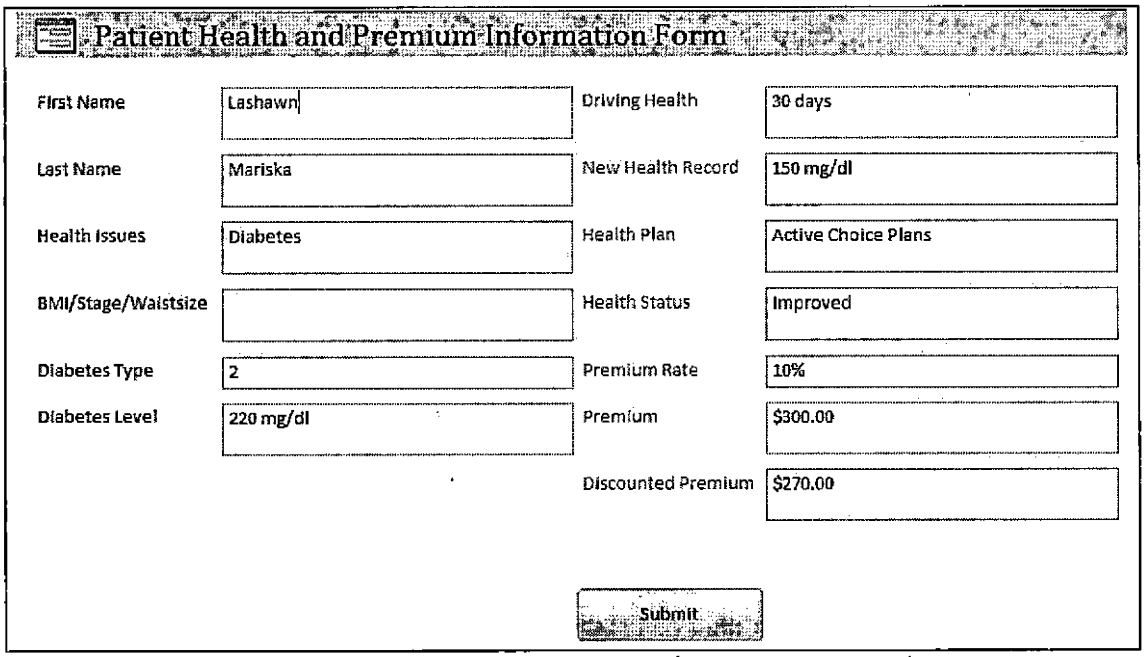


Figure 19. Patient Health and Premium Information Form

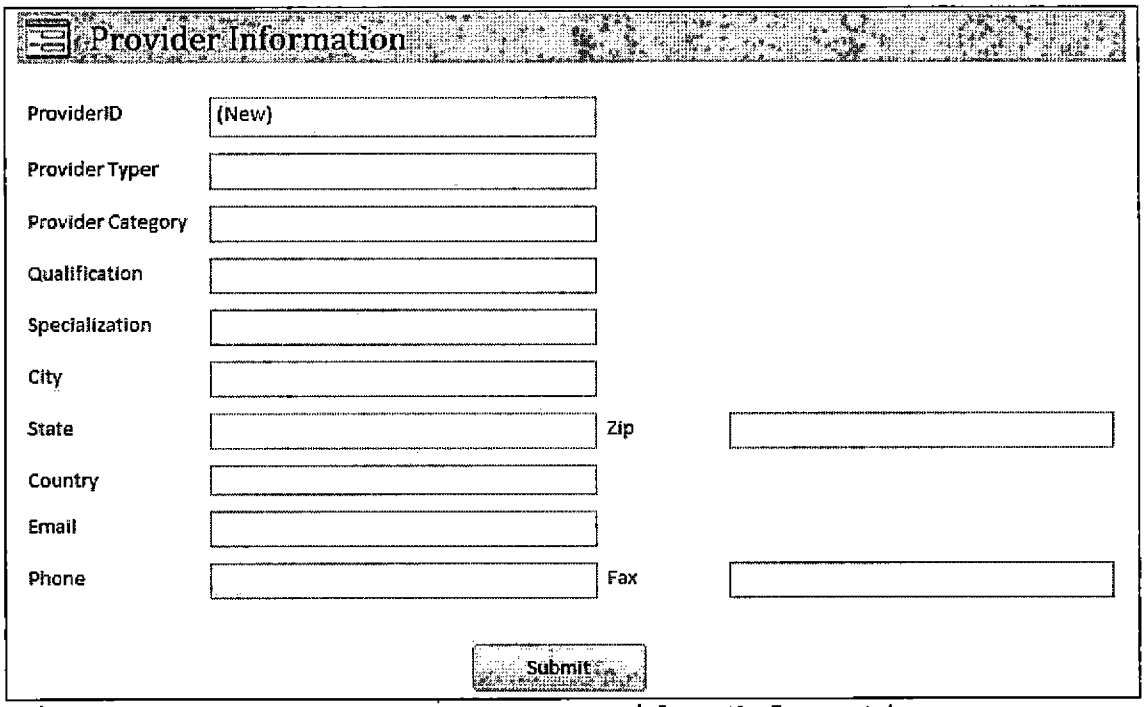
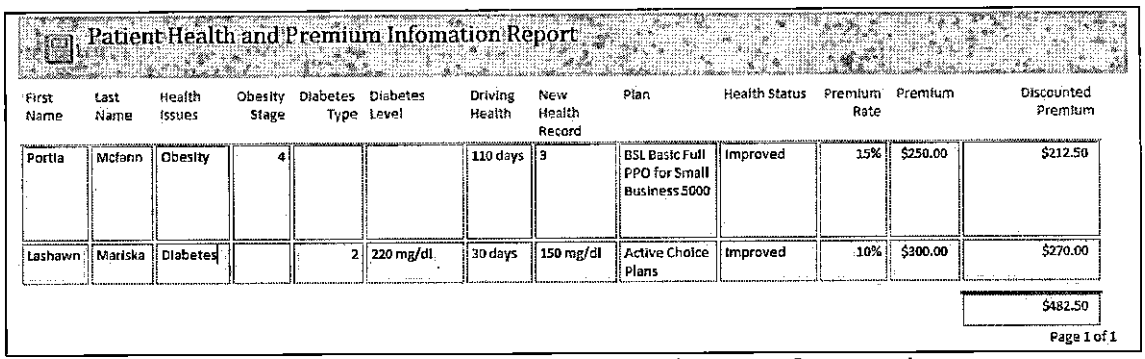


Figure 20. Doctors, Nurses, Provider Information

Figure 21 shows the report of Patient Health and Premium Information from the prototype system. This report will help patients to see how they are driving their health and how their health insurance premium is being derived. This report also gives information about the improvement or degradation in patient's health allowing patients to see how improving their health can save them money.



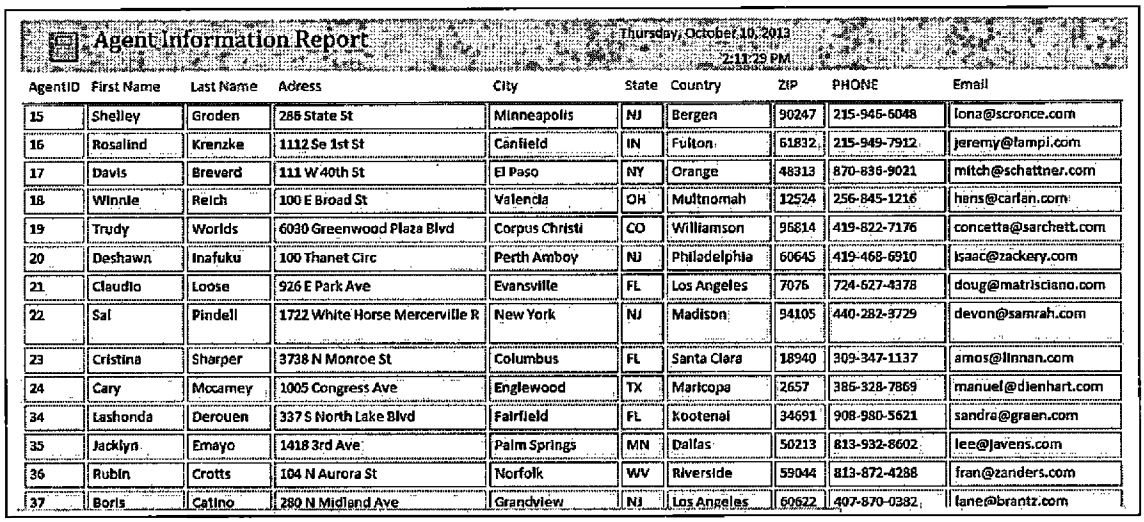
Patient Health and Premium Infomation Report

First Name	Last Name	Health Issues	Obesity Stage	Diabetes Type	Diabetes Level	Driving Health	New Health Record	Plan	Health Status	Premium Rate	Premium	Discounted Premium
Portia	Mcfann	Obesity	4			110 days	3	BSL Basic Full PPO for Small Business 5000	Improved	15%	$250.00	$212.50
Lashawn	Mariska	Diabetes		2	220 mg/dl	30 days	150 mg/dl	Active Choice Plans	Improved	10%	$300.00	$270.00
												$482.50

Page 1 of 1

Figure 21. Patient Health and Premium Information Report

Several reports are prepared to help the insurance companies and medical service providers to make the decisions. Agent information report which can be used by the insurance companies (See Figure 22).



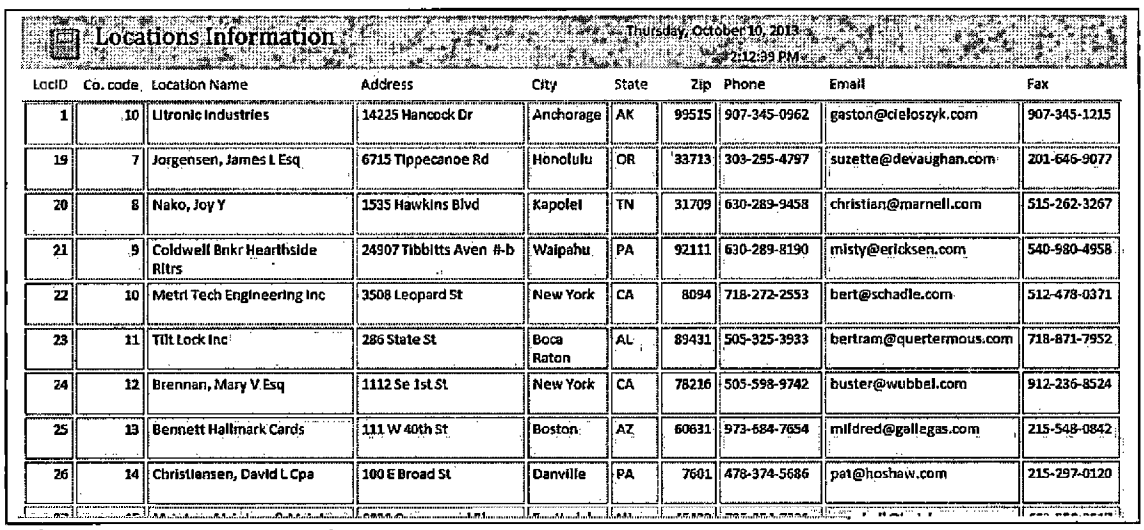
Agent Information Report

Thursday, October 10, 2013
2:11:29 PM

AgentID	First Name	Last Name	Adress	City	State	Country	ZIP	PHONE	Email
15	Shelley	Groden	288 State St	Minneapolis	NJ	Bergen	90247	215-945-6048	lona@scronce.com
16	Rosalind	Krenzke	1112 Se 1st St	Canfield	IN	Fulton	61832	215-949-7912	jeremy@lampi.com
17	Davis	Breverd	111 W 40th St	El Paso	NY	Orange	48313	870-836-9021	mitch@schattner.com
18	Winnie	Reich	100 E Broad St	Valencia	OH	Multnomah	12524	256-845-1216	hans@carlan.com
19	Trudy	Worlds	6030 Greenwood Plaza Blvd	Corpus Christi	CO	Williamson	96814	419-822-7176	concetta@sarchett.com
20	Deshawn	Inafuku	100 Thanet Circ	Perth Amboy	NJ	Philadelphia	60645	419-468-6910	isaac@zackery.com
21	Claudio	Loose	926 E Park Ave	Evansville	FL	Los Angeles	7076	724-627-4378	doug@matrisciano.com
22	Sal	Pindell	1722 White Horse Mercerville R	New York	NJ	Madison	94105	440-282-3729	devon@samrah.com
23	Cristina	Sharper	3738 N Monroe St	Columbus	FL	Santa Clara	18940	309-347-1137	amos@linnan.com
24	Cary	Mccamey	1005 Congress Ave	Englewood	TX	Maricopa	2657	386-328-7869	manuel@dienhart.com
34	Lashonda	Dercuen	337 S North Lake Blvd	Fairfield	FL	Kootenai	34691	908-980-5621	sandra@graen.com
35	Jacklyn	Emayo	1418 3rd Ave	Palm Springs	MN	Dallas	50213	813-932-8602	lee@javens.com
36	Rubin	Crotts	104 N Aurora St	Norfolk	WV	Riverside	59044	813-872-4288	fran@zanders.com
37	Boris	Catino	280 N Midland Ave	Grandview	NJ	Los Angeles	60622	407-870-0382	jane@brantz.com

Figure 22. Agent Report

Location information report will help the insurance companies to keep record of the number of locations and their information (See Figure 23).



Locations Information

Thursday, October 10, 2013
2:12:39 PM

LocID	Co. code	Location Name	Address	City	State	Zip	Phone	Email	Fax
1	10	Litronic Industries	14225 Hancock Dr	Anchorage	AK	99515	907-345-0962	gaston@cieloszyk.com	907-345-1215
19	7	Jorgensen, James L Esq	6715 Tippecanoe Rd	Honolulu	OR	33713	303-295-4797	suzette@devaughan.com	201-646-9077
20	8	Nako, Joy Y	1535 Hawkins Blvd	Kapolei	TN	31709	630-289-9458	christian@marnell.com	515-262-3267
21	9	Coldwell Bnkr Hearthside Rltrs	24307 Tibbitts Aven #-b	Waipahu	PA	92111	630-289-8190	misty@ericksen.com	540-980-4958
22	10	Metri Tech Engineering Inc	3508 Leopard St	New York	CA	8094	718-272-2553	bert@schadle.com	512-478-0371
23	11	Tilt Lock Inc	286 State St	Boca Raton	AL	89431	505-325-3933	bertram@quertermous.com	718-871-7952
24	12	Brennan, Mary V Esq	1112 Se 1st St	New York	CA	78216	505-598-9742	buster@wubbel.com	912-236-8524
25	13	Bennett Hallmark Cards	111 W 40th St	Boston	AZ	60631	973-684-7654	mildred@gallegas.com	215-548-0842
26	14	Christiansen, David L Cpa	100 E Broad St	Danville	PA	7601	478-374-5686	pat@hoshaw.com	215-297-0120

Figure 23. Locations Report

Figure 24 shows the Patient Personal Information Report along it, it also provides the health information of the patient. Based on this health information report insurance companies will charge the premium to the customers/members.

Patient Personal Information

Thursday, October 10, 2013
2:13:03 PM

PatientID	Firstname	Lastname	Address	City	State	Zip	Phone	Age	Gender	HealthStatu
1	Portia	Mcfann	4891 Pacific Hwy	San Diego	CA	92110	858-294-0682	50	Male	Improved
2	Andrew	Fenstermacher	2400 N Jefferson St	Perry	FL	32347	850-584-7434	15	Female	Worsen
3	Brady	Tatum	710 N Cable Rd	Lima	OH	45805	419-222-8541	10	Female	Worsen
4	Gracie	Riskalla	5345 Madison Ave	Sacramento	CA	95841	916-344-7735	48	Male	Worsen
5	Helga	Rio	5108 W Gore Blvd	Lawton	OK	73505	580-357-0385	84	Female	Improved
6	Shirley	Keams	8 N Water St	Nantucket	MA	2554	508-228-6114	35	Female	Improved
7	Willie	Coughenour	1715 Saint Marys Ave	Parkersburg	WV	26101	304-422-8589	22	Male	Improved
8	Lashawn	Mariska	5600 Sw 6th Ave	Topeka	KS	66606	785-272-6823	56	Male	Improved
9	Linda	Golda	60 Monroe Center St Nw	Grand Rapids	MI	49503	616-451-2797	21	Male	Improved
10	Tyler	Hendershott	3222 Winona Way	North Highlands	CA	95660	916-349-5439	21	Male	Improved
11	Guillermo	Bramhall	1617 27th St	Lubbock	TX	79405	806-763-8915	20	Female	Consistant
12	Pattie	Brudnicki	1355 California Ave	Las Cruces	NM	88001	505-525-8255	15	Male	Improved

Figure 24. Patients Report

Figure 25 shows the query from the prototype system that is preprogrammed to pull information from database. It also gives the view of how the information can be produced by programming queries needed for interpretation.

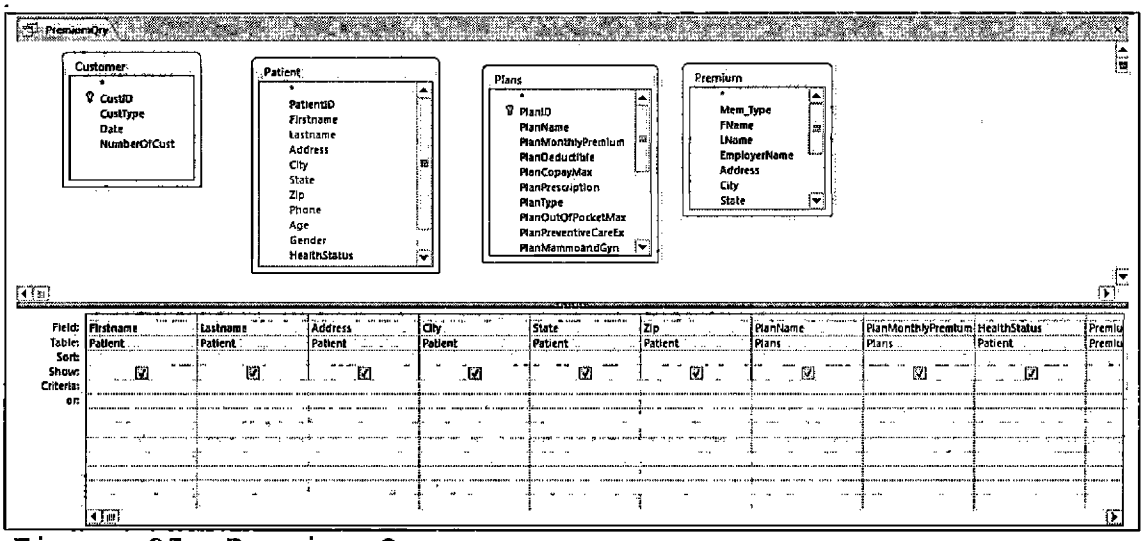
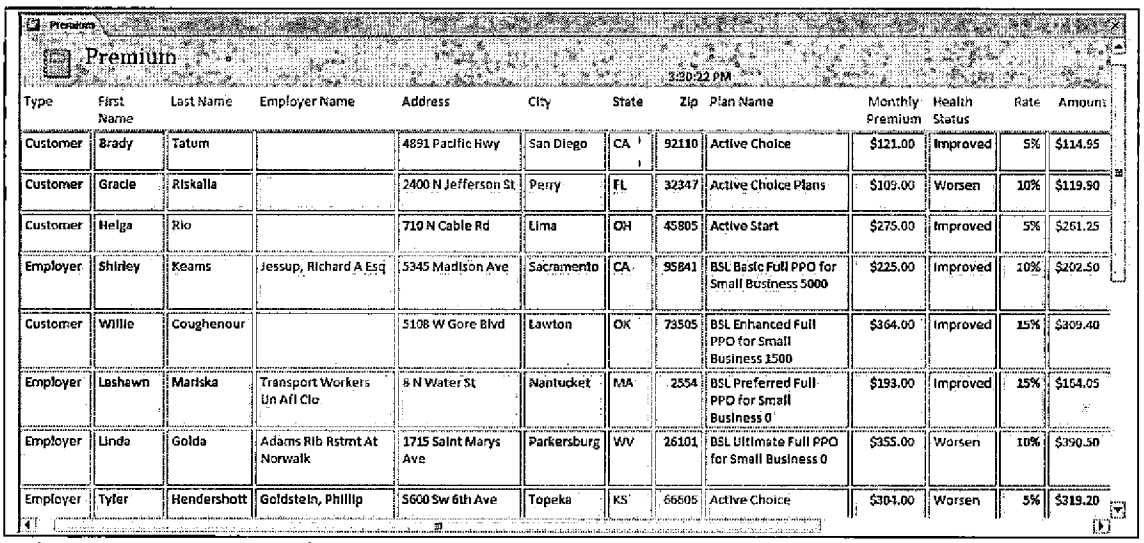


Figure 25. Premium Query

Figure 26 shows the report which is generated from the above query (See Figure 25). This report will help the insurance companies to charge premiums form their customers. It can also reflect the fluctuations/discount on the premiums.



Premium

3:20:22 PM

Type	First Name	Last Name	Employer Name	Address	City	State	Zip	Plan Name	Monthly Premium	Health Status	Rate	Amount
Customer	Brady	Tatum		4891 Pacific Hwy	San Diego	CA	92110	Active Choice	$121.00	Improved	5%	$114.95
Customer	Gracie	Riskalla		2400 N Jefferson St	Perry	FL	32347	Active Choice Plans	$109.00	Worsen	10%	$119.90
Customer	Helga	Rio		710 N Cable Rd	Lima	OH	45805	Active Start	$275.00	Improved	5%	$261.25
Employer	Shirley	Kearns	Jessup, Richard A Esq	5345 Madison Ave	Sacramento	CA	95841	BSL Basic Full PPO for Small Business 5000	$225.00	Improved	10%	$202.50
Customer	Willie	Coughenour		5108 W Gore Blvd	Lawton	OK	73505	BSL Enhanced Full PPO for Small Business 1500	$364.00	Improved	15%	$309.40
Employer	Lashawn	Mariska	Transport Workers Un Afl Clo	8 N Water St	Nantucket	MA	2554	BSL Preferred Full PPO for Small Business 0	$193.00	Improved	15%	$164.05
Employer	Linda	Golda	Adams Rib Rstrnt At Norwalk	1715 Saint Marys Ave	Parkersburg	WV	26101	BSL Ultimate Full PPO for Small Business 0	$355.00	Worsen	10%	$390.50
Employer	Tyler	Hendershott	Goldstein, Phillip	5600 Sw 6th Ave	Topeka	KS	66605	Active Choice	$304.00	Worsen	5%	$319.20

Figure 26. Premium Charged Report

3.4 Database Design

3.4.1 Data Analysis

DHIPS is the application driven by the database. The database is the major system module contributing to the overall system performance. It is important to maintain database integrity and to increase database access, security and performance. OLEDB along with ADO.NET acts as interface between database and server pages. 'DataSet' and

'DataReader' is used in .NET framework which simplifies the task of reading/writing the database. ".NET technology enhances DataSet, DataTable, DataRow, and DataColumn classes which set up a relation between tables and constraints as a part of DataSet" (Nagel, Evjen, Glynn, Watson, & Skinner, 2010). The database will also be encrypted and have other password policies to maintain the security of the information.

3.4.2 Database Specification

Database specification is divided in the following three categories:

1. Business rules
2. Conceptual database (ER model)
3. Logical database

1. Business Rules and assumptions:

- Insurance company can have several locations which offer many plans.
- Insurance company can have many customers/members who want coverage. It can also have employers who want coverage for their employees.
- Company can have agents and administrators as employees. Agents can offer many plans

at their location and administrators will maintain system and website.

- Member/customer can visit several providers for checkup for many times. Member can be primary or secondary or children.
- Customer/member may make payment through debit/credit card.
- Many providers of members can make the claims.
- Each plan has at least one member/customer.
- Insurance company has at least one location.
- Providers can be of many types such as doctors, facilities, dentists, vision care, pharmacies, equipment and supplies.
- Agents can offer many plans and each plan can be offered by many agents.
- Member may have dental plan along with health coverage plan but member cannot only have dental plan without health coverage plan.

2. Conceptual database (ER model):

Conceptual database shows all the entities involved in DHIPS database. Entity Relationship Diagram is shown in Figure 27 below.

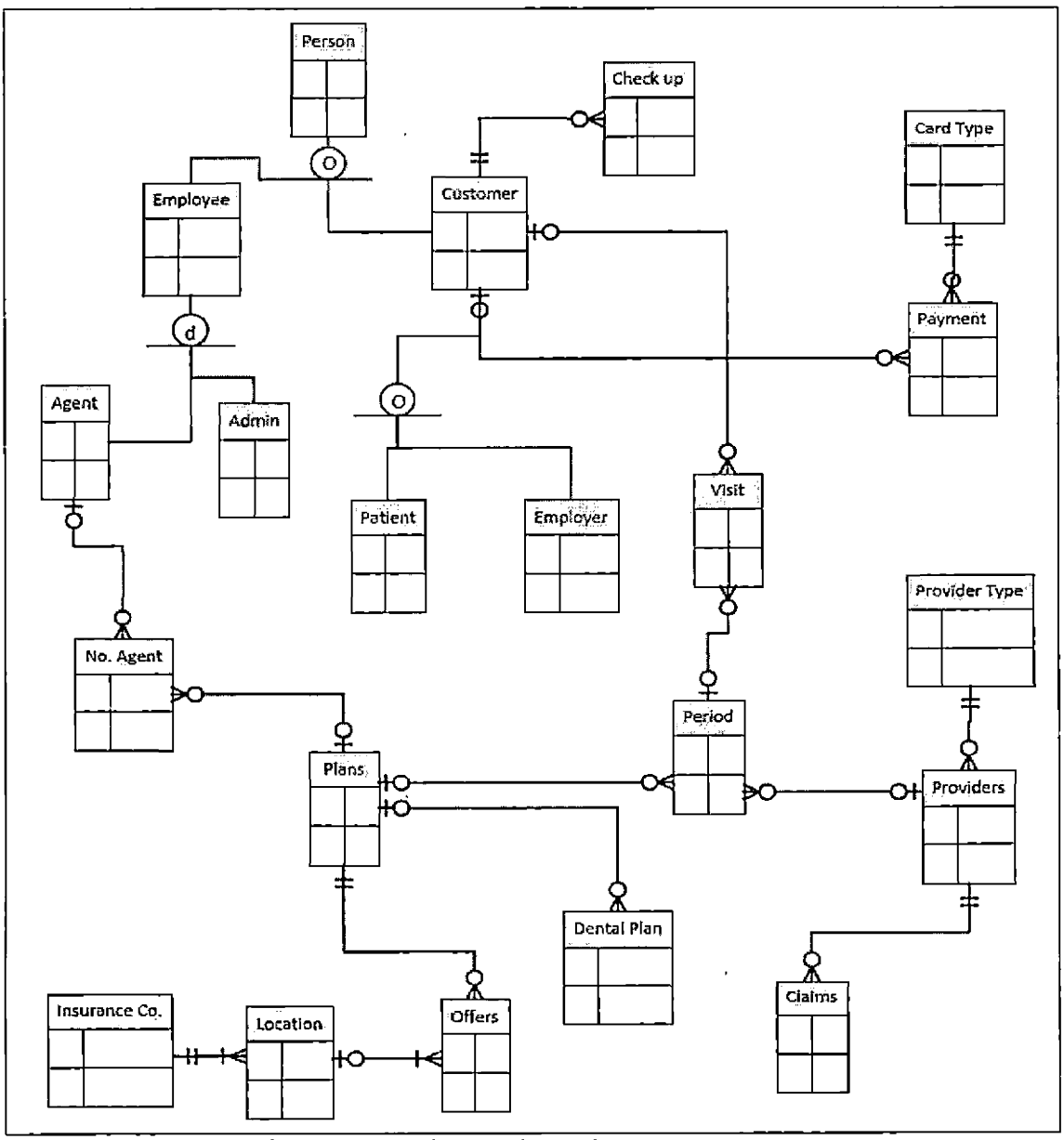


Figure 27. Entity Relationship Diagram

3. Logical Schema database models:

Logical database comprises tables and structures. Logical models display the schema of the database. Tables are all in a normalized stage to avoid anomalies and the underlined attribute is the primary key of that particular table. As seen in Appendix A.

3.4.3 Database Description

A detailed description of each table along with their subtitles is given below. The subtitles are fields, data types, null/not null key, description of particular field is also given in Appendix B.

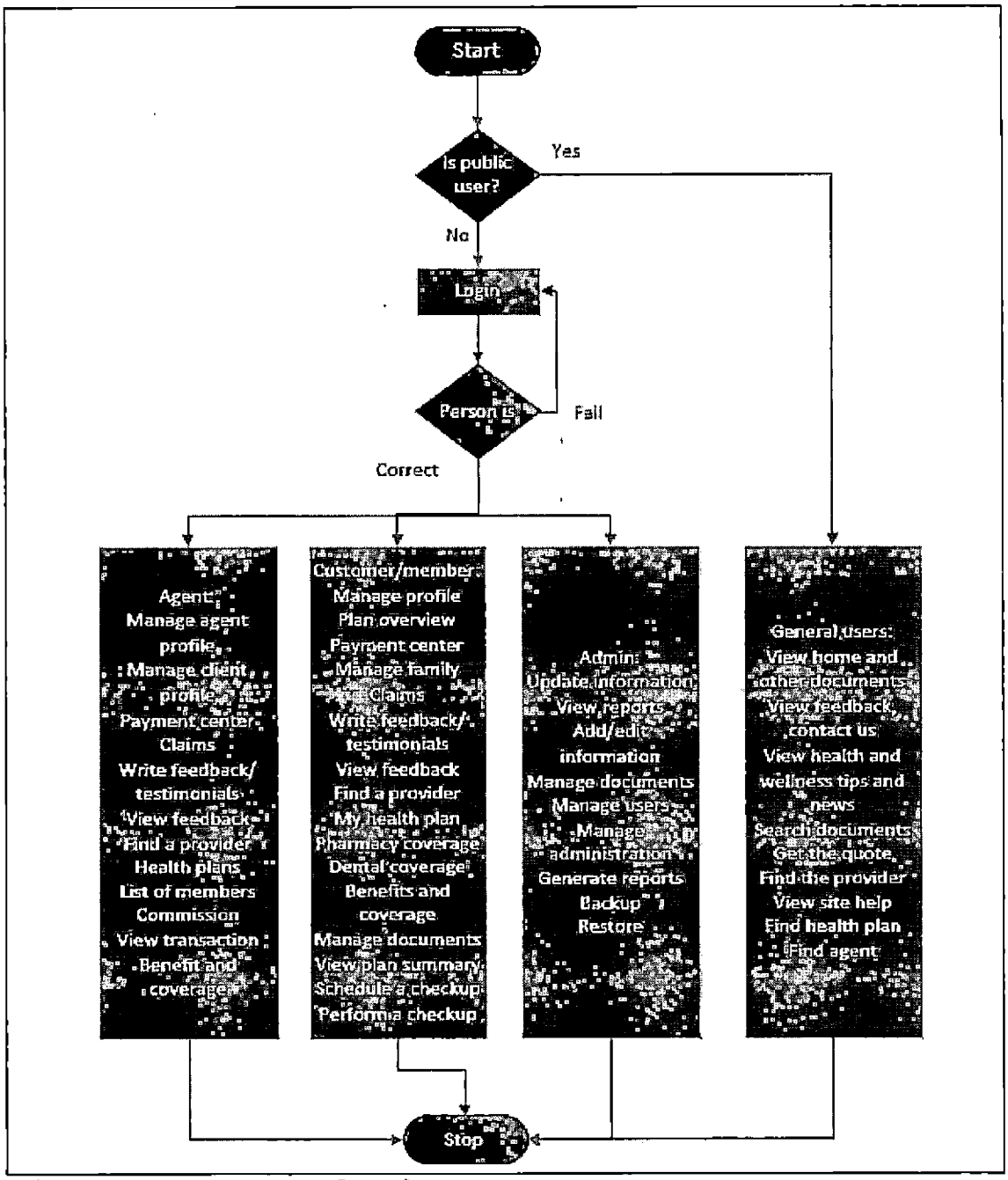


Figure 28. System Flowchart

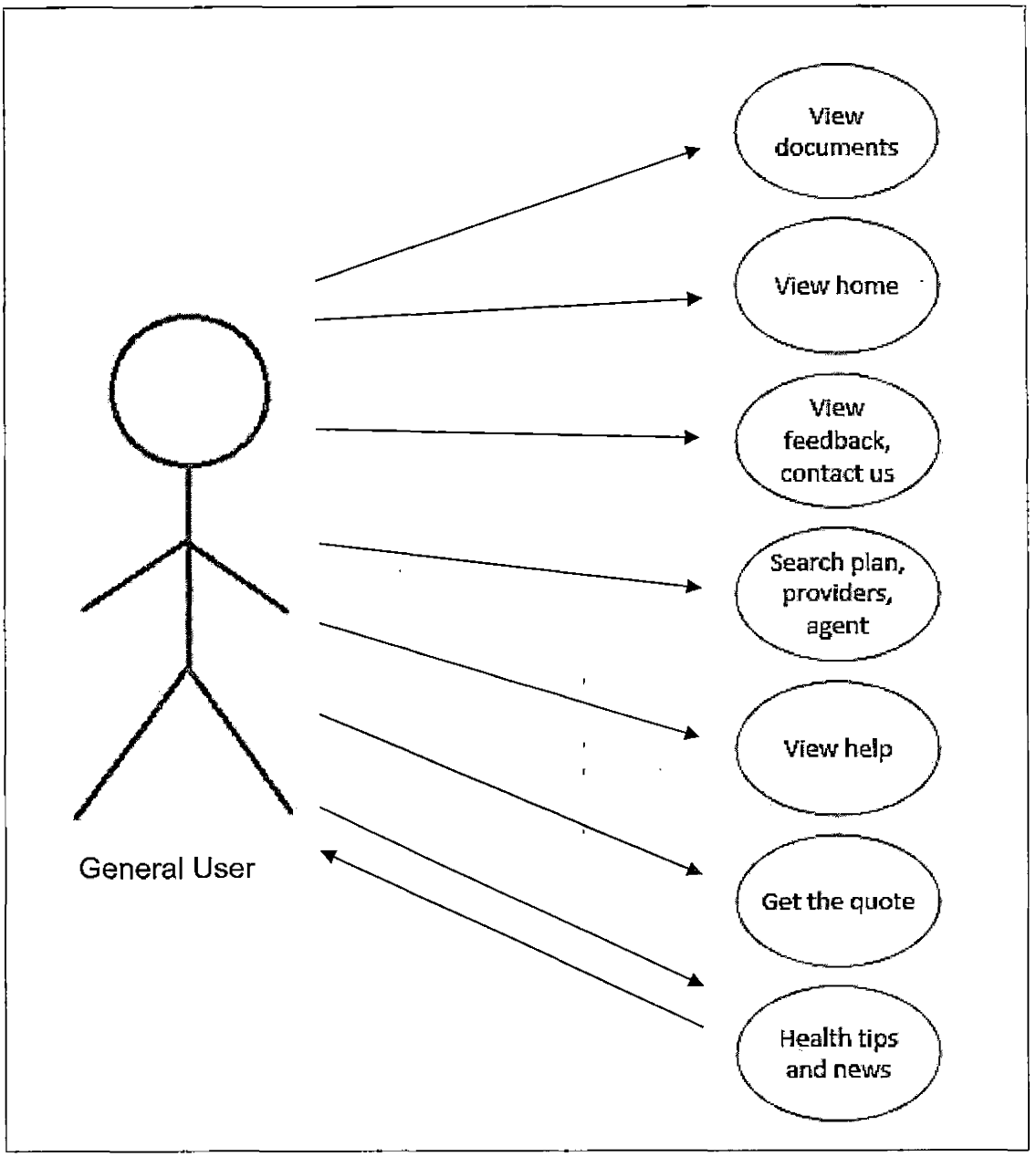


Figure 29. General User Use Case

A general user can be any user who would visit the site or it could be prospective member. A general user has the characteristics as shown in the use case above. They

can view the plans, get a suitable plan, find a provider, find an agent, view feedback and testimonials, get help, health tips and news, and can also create the account if desired.

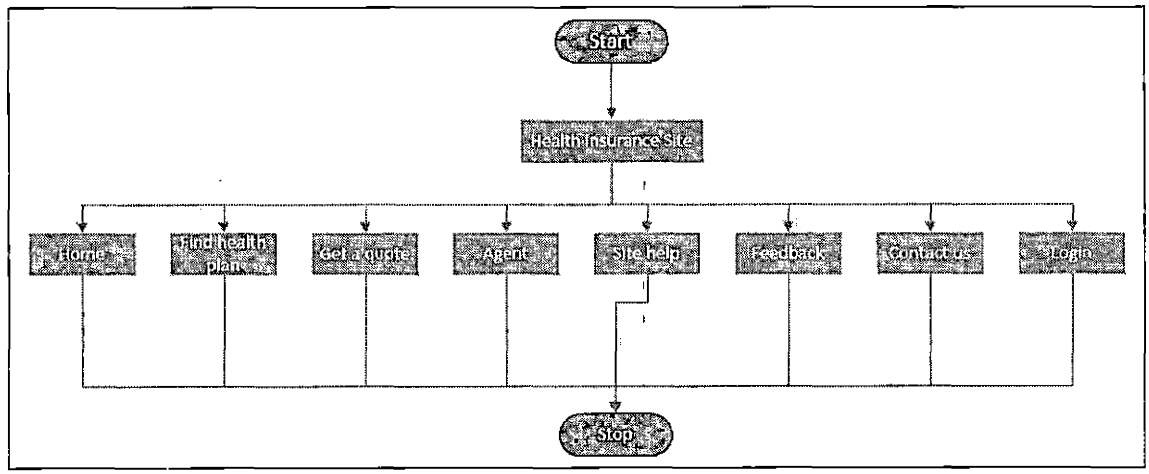


Figure 30. General User Flow Chart

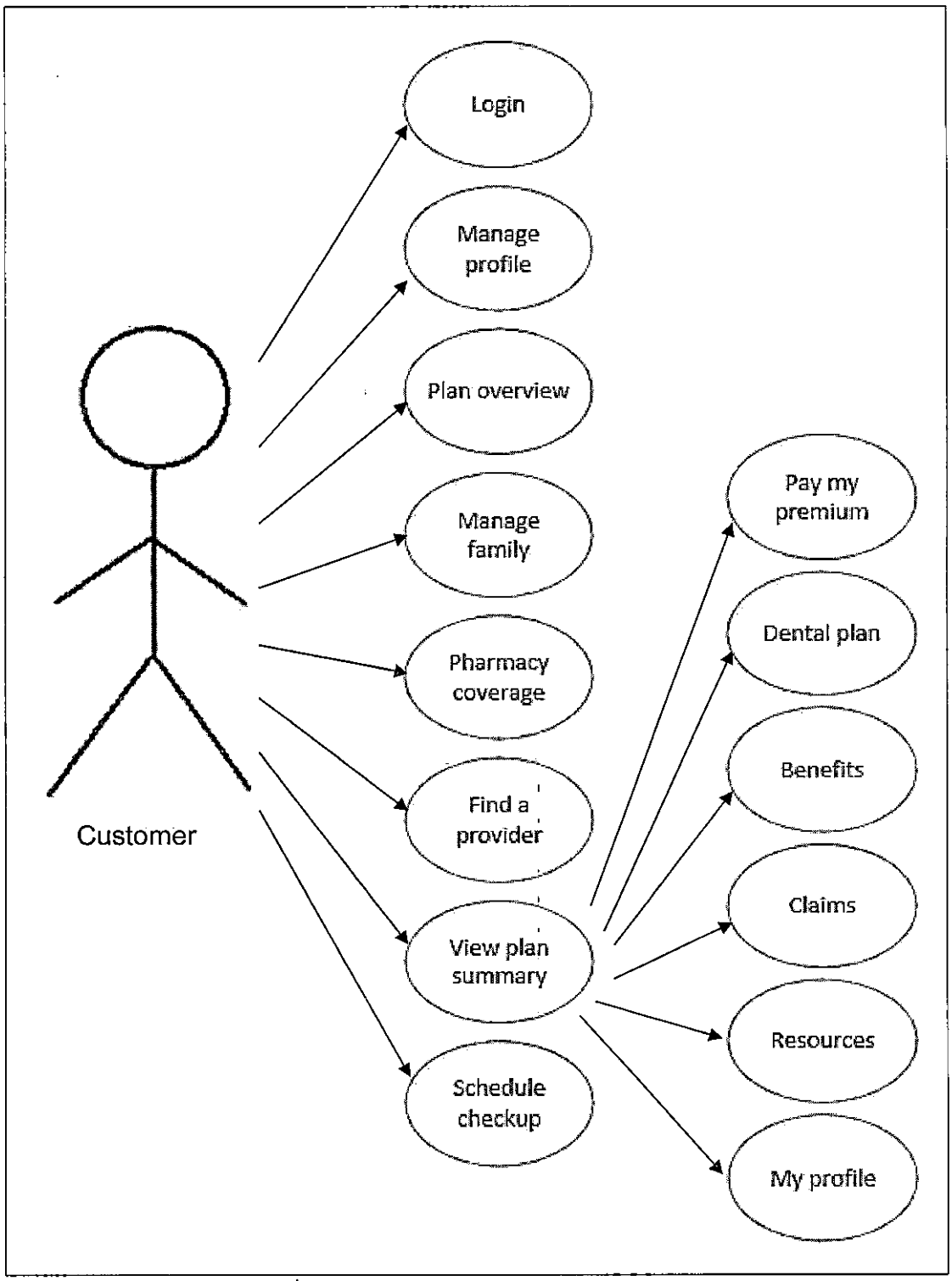


Figure 31. Member/Customer Use Case

A member/customer can login and view the plan summary, plan benefits and coverage, payment history and dues, find a provider, change the plan, add family members, view pharmacy coverage, manage profile, view and write feedback, view health tips and news and schedule appointments with their provider. The use case diagram for member/customer is shown above.

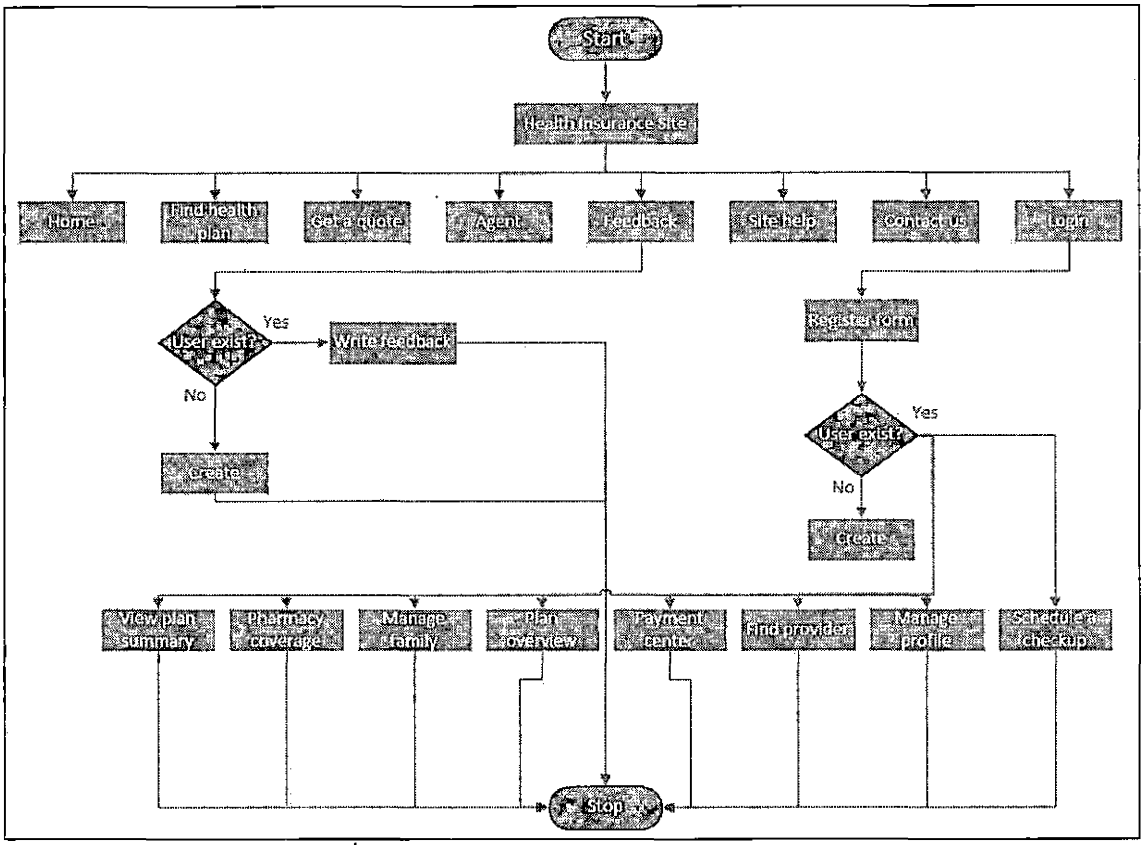


Figure 32. Member/Customer Flowchart

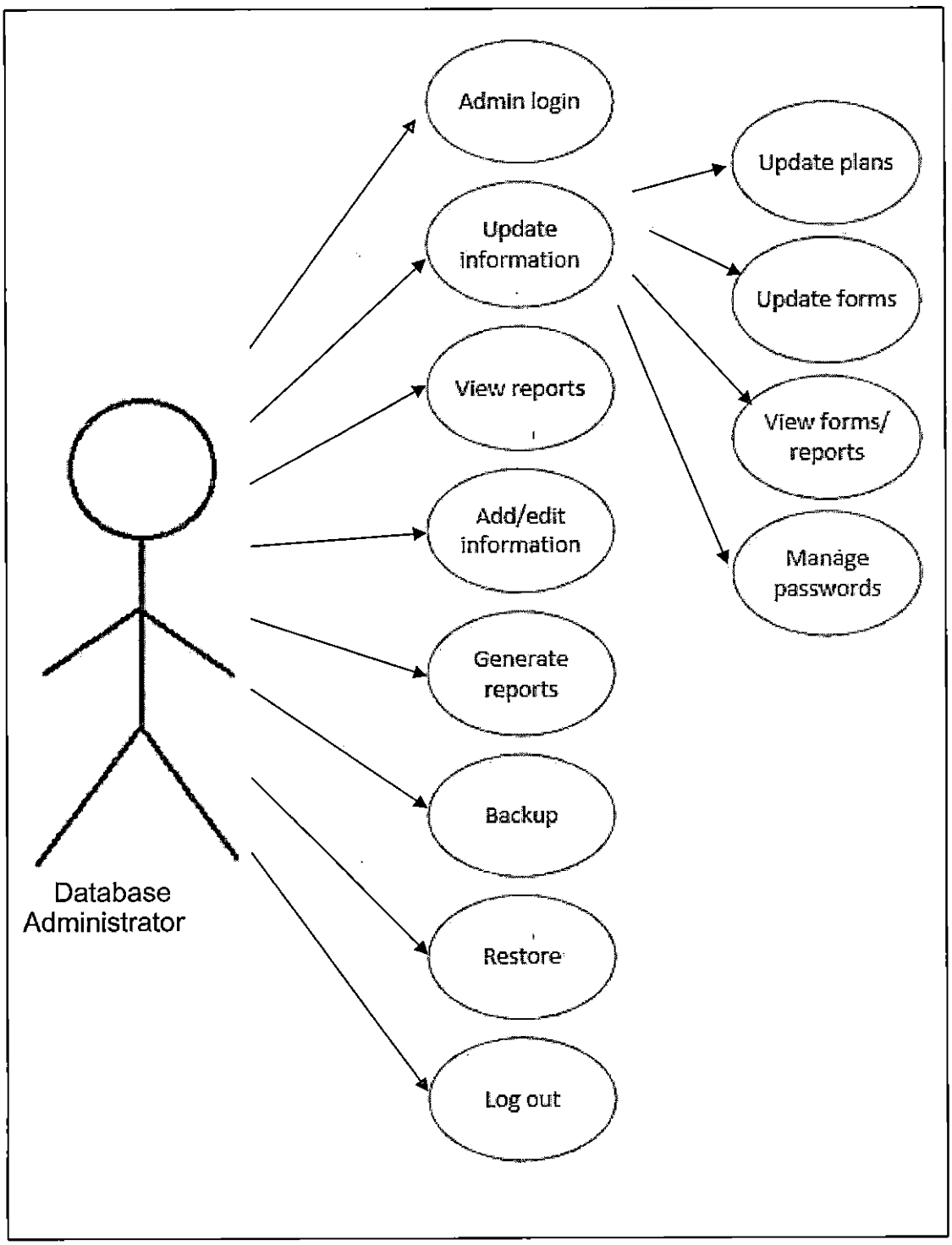


Figure 33. Admin Use Case

Admin users are the superlative users and the use case for admins is shown above. Administrators can manage all the information, view and edit information, create and view reports, edit and update forms, generate backup, manage passwords and other credentials for all users, and also provides a database restore when necessary.

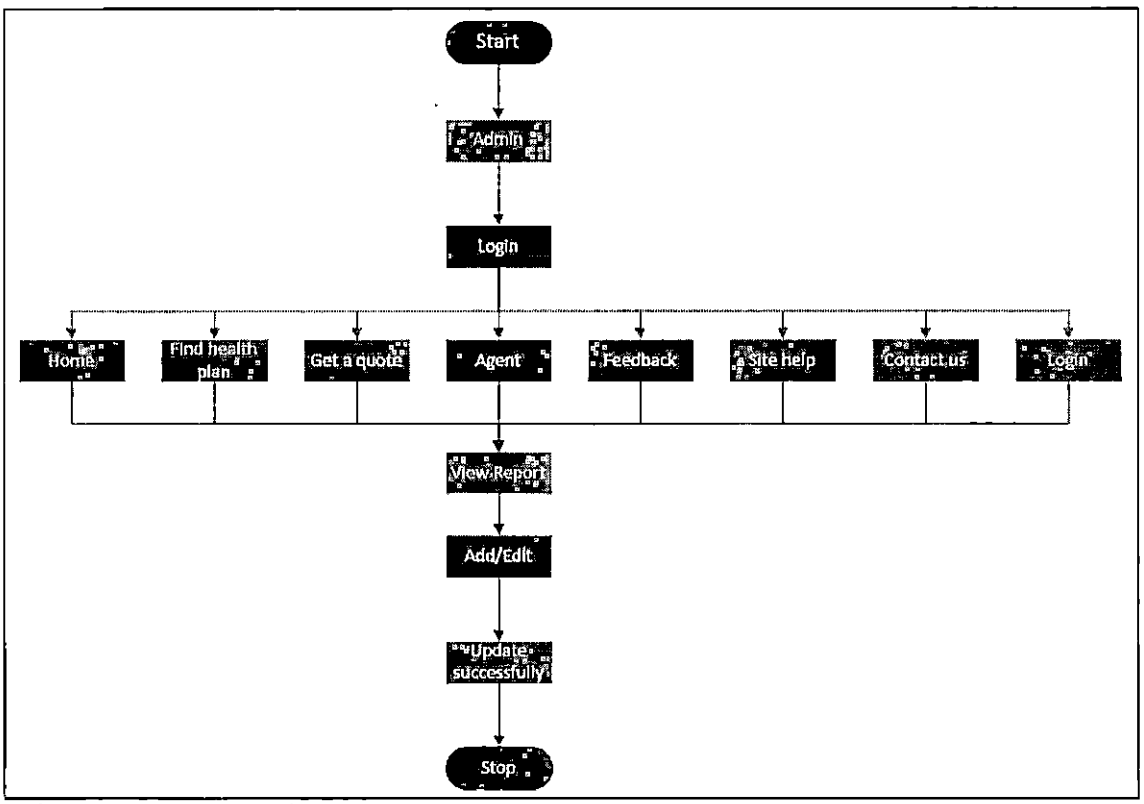


Figure 34. Admin Flowchart

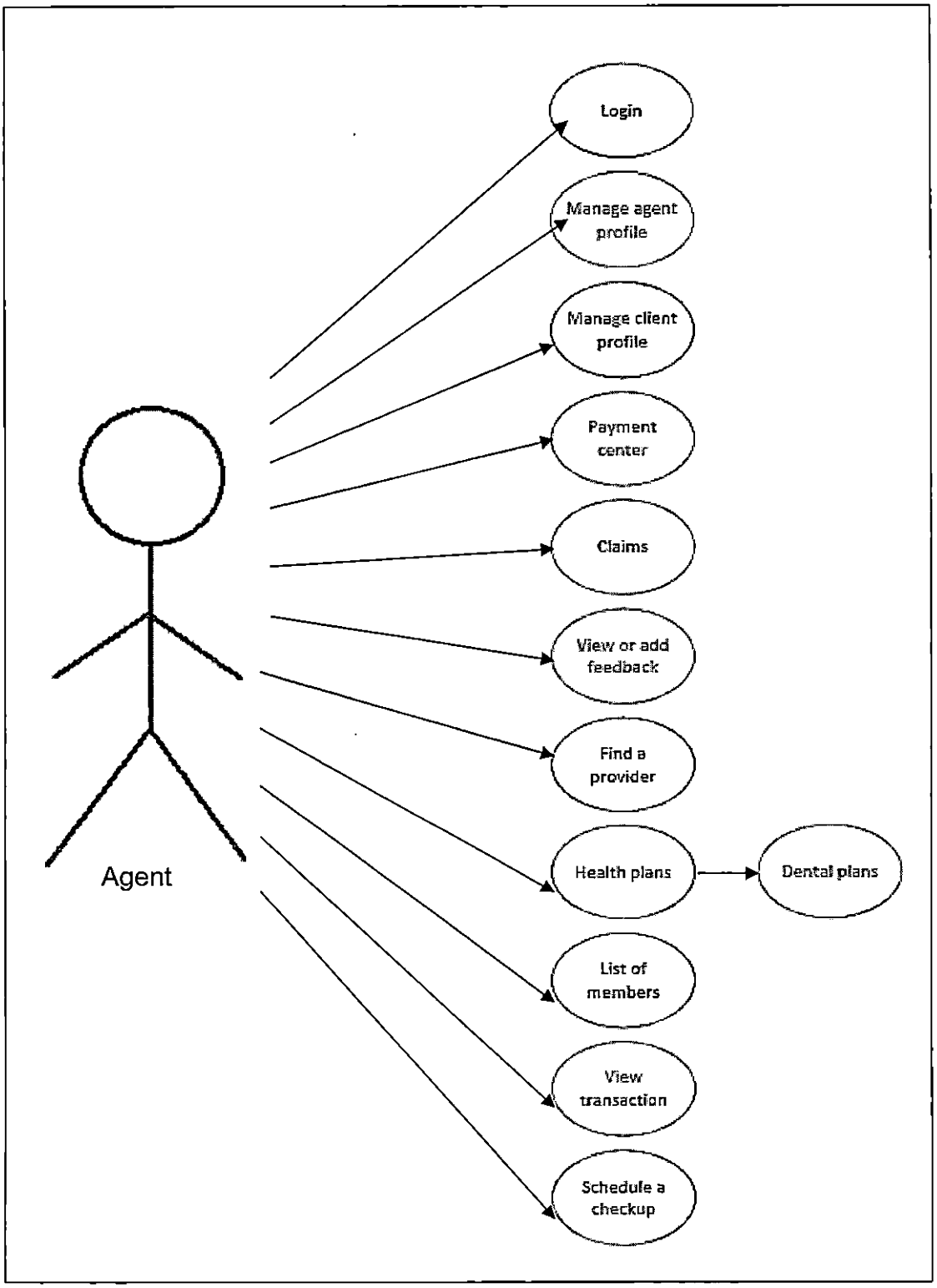


Figure 35. Agent Use Case

Agent use case is shown above. Agent will have access to the agent information, agent login, find plans, find providers, health tips and news, member profile, view the members plan summary, write feedback, view feedback, schedule appointments, view the dues and transaction history, and edit member information.

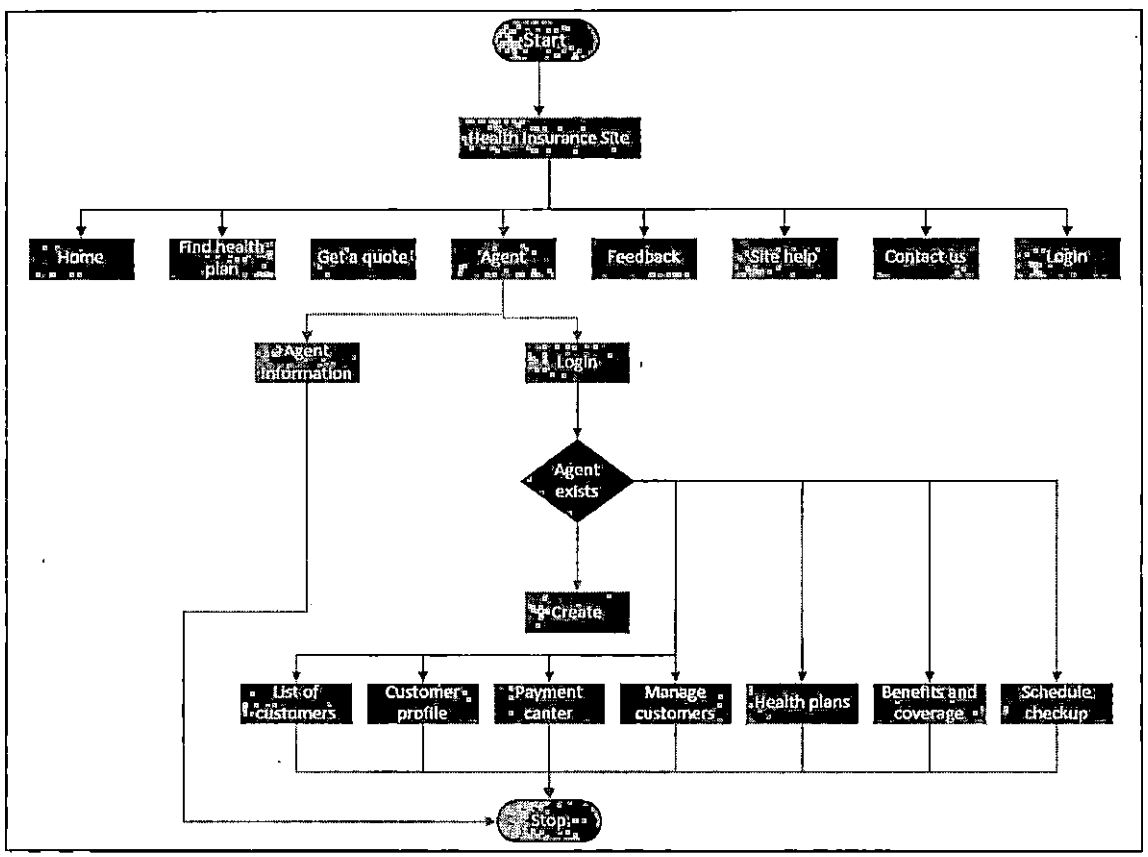


Figure 36. Agent Flow Chart

CHAPTER FOUR

SECURITY OF THE SYSTEM

4.1 Introduction

As every industry goes digital with records, so is the health care industry. More doctors and hospitals are going digital every day. This data is stored in several systems and gadgets like iPads, laptops and medical systems. More structured data is maintained in databases and it is easier to access and transfer the data whenever and wherever desired as everything goes digitized. There are greater chances of security breaches of this data and patient privacy being compromised. In 1996 Congress passed the Health Insurance Portability and Accountability Act (HIPAA). HIPAA is the privacy rule which protects individually identifiable health information. It mandates standards for health care information during processes and requires confidentially handling and protecting of health information. HIPAA is aimed at reducing health care information fraud and abuse.

According to the Healthcare Information and Management Systems Society's conference in 2013, over the last 10 years with all the advancement in technology, 2012 had the most data breaches. Out of 1,519 data breaches,

327 data breaches occurred in health care alone (Hacking and HIMSS, 2013).

In the health care industry, it is the responsibility of health care service providers and entities involved in providing such services, to provide protection to the personally identifiable information that has been entrusted to them. To be more specific, personally identifiable information is information that provides the identity of an individual directly or indirectly should be protected from being breached or compromised. If personally identifiable or confidential information is disclosed, lost or compromised without proper authorization, it can result in substantial harm, inconvenience or embarrassment to an individual and can also result in a law suit.

Each study indicates that medical records hold an average black market value of $50 per record. Surveys say in previous two years 94% of health care organizations have had at least one breach. Data now can reside in several locations (laptops and tablets, including unsecured smartphones) and can be transported to an unlimited number of locations by outside hackers, thieves or device stealers or social engineering experts, who have more areas to target.

In 2003, 5 million people were victims of identity theft. In 2012, that number jumped to 12.5 million. This is due, in part, to the fact that a decade ago, most breaches were caused by human error like lost devices or records being exposed in insecure ways (Health data breaches usually aren't accidents anymore, 2013). Across the US, many health care organizations have suffered data breaches. More than 21,000 patients were impacted by a triad of recent healthcare data breaches all over the U.S. (Health data breaches usually aren't accidents anymore, 2013).

According to Journal and Courier on May 10 2013, nearly 10,000 patients privacy had been compromised due to property theft. Indiana University Health Arnette Indiana realized in April 2013 that an employee's password protected laptop which had the information about the patient was stolen from a car. The laptop included the patients' names, date of birth, diagnoses, date of service and medical record numbers (Patient Information Breach at the MED, 2013).

According to WREG nearly 1,200 patients were impacted by security breach in Regional Medical Center (MED) in Memphis. From October 2012 to February 2013 three emails were sent which included personal information of patient

such as name, account number, date of birth, social security number, home phone number and type of service received (Patient Information Breach at the MED, 2013).

According to Charlotte Observer, in North Carolina around 10,000 persons privacy had been compromised as hacker broke into their website to access a database of personal information which included names, contact information, date of birth and credit card numbers of the patients and employees. There was not any breach of medical information but identity theft would have been possible.

4.2 Hacking Technique

Through HIPAA patient privacy and security requirements, a breach of patient data will cost both patients' trust and a penalty payment. Each entity that accesses the medical resources or information needs to be complaint with HIPPA privacy and security guide. While it is the business of security professionals to make networks HIPAA complaint, over the past several decades due to development in technology, it is still possible for hackers to break into secure networks. According to ITRC breach report, of all breaches that have occurred so far in 2013, 48 percent have been data breaches in the health

care industry. In 2012, total records lost were 2,237,873 and there were 154 breaches in the medical and healthcare sector which accounted for 34.5 percent of all breaches in 2012 (ITRC Breach Report 2012, 2012).

Protected Health Information (PHI) has been considered one of the most vulnerable types of data. PHI includes personal information such as birth dates, private addresses, social security numbers and other private information. This type of sensitive information is everything that a hacker is looking for. Stealing this type of data allows a hacker to steal a patient's identity and open credit cards or other accounts under the patient's name or expose patient's confidential information. Hackers usually target healthcare providers because they store all protected health information and records conveniently in one place. They target small providers like health insurance companies because small providers are less likely to invest adequately for data security. Once the DHIPS has been implemented, DHIPS will have huge amount of PHI which hackers might access. Systems should be protected and employees and customers should be guided with the help of security awareness programs.

There are many common misconceptions to try to keep hackers out, up-to-date virus protection and a secure firewall is sufficient. Hackers do not need to circumvent virus protection or get behind a firewall to get access to the patient's information. They get in by manipulating person's conduct to trust sources they consider to be genuine, take benefit of "good deals", or make their work easier.

According to the HIMSS (Healthcare Information and Management Systems Society) conference in 2013, the following methods have been utilized by hackers to gain access to confidential information which lay in IT systems of hospitals and health insurance companies.

1. Social Engineering techniques
2. USB flash drives
3. Phishing
4. Exploit
5. Social Engineering techniques:

   Social Engineering techniques are used in almost all kind of security breaches. It is a technique through which hackers try to manipulate people to perform a certain task or divulge confidential information by using the person's propensity to trust. The goal of the hacker is

to acquire the information that will help them gain unauthorized access to the system.

For instance, at a health care facility a hacker may pretend to be a person of authority and ask for a password. Or a hacker can just walk into the facility by pretending to be a maintenance worker or concierge and then watch the employees typing in their password, or look for passwords lying around on sticky notes on the computer or the desk.

2. USB drives:

With the help of social engineering techniques hacker may get in to the facility with USB flash drives containing malicious software. Once the USB drive is plugged in to the computer, the computer automatically executes the malicious software and attacks it with a virus. All the hacker will have to do is get into the facility. Once the hacker gains access to the facility they will only need to leave a number of infected USB drives and then wait until the employees pick them up. If an employee inserts that USB drive on the computer and, if mistakenly, the employee has administrative

rights to the network (which will be likely case in unsecure facilities), the hacker will have access to many other computers on that particular domain and also unlimited access to medical and personal information.

3. Phishing:

Phishing is the technique where a hacker will make an effort to obtain personal information by fraudulent means. A hacker may send a fraudulent email that will appear as if it is authentic and has come from the known, trustworthy and legitimate person, web site or company. These emails usually guide the recipient to the malicious web site which may request personal information.

For example a person who has recently renewed her insurance with the company coincidently receives the email with the logo of the insurance company form the hacker stating that her health benefits renewal is being processed but new HIPPA requirements needs each renewing candidate to complete a form for further review. With the logo on the email person may find it as authentic and legitimate email. Thus fraudulent

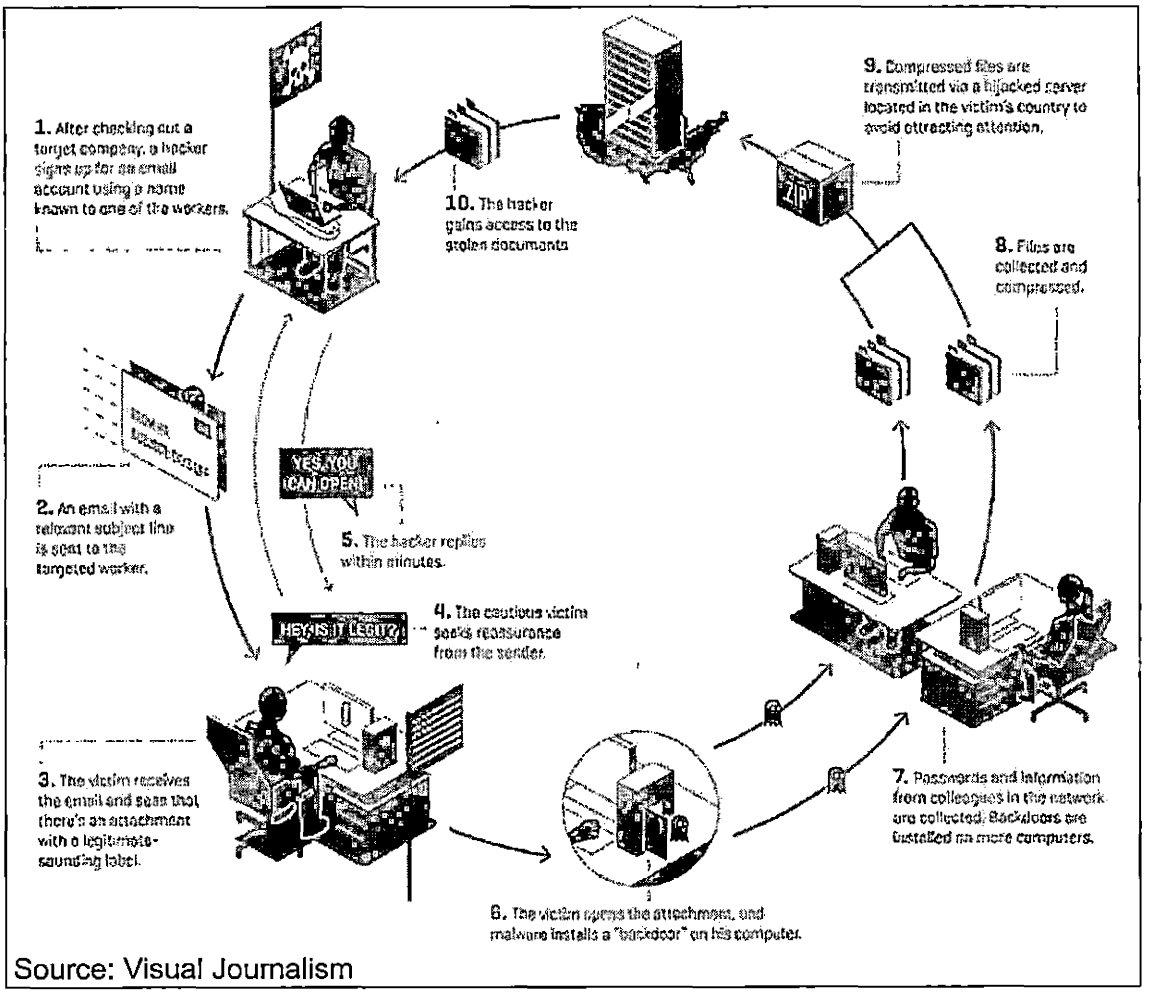
email is believed to be real and the person will complete the form and give their personal information to the hacker.

4. Exploit:

Once a hacker gets in to the facility with the help of social engineering techniques a hacker may install a back door into the system and control the system maliciously. And if the back door is already created then hacker will locate the back door can breach the integrity of the information.

4.3 Security Breach

First and foremost, a hacker gets information about the target company with the help of social engineering techniques. The attack performed by the hacker as shown in Figure 37 Security Breach below.



Source: Visual Journalism

Figure 37. Security Breach

4.4 Security Measures

Hackers recognize how people react and respond. And then take the advantage of the same. Hackers are continuously changing the email addresses which they use to send out an attack therefore blacklisting/blocking the mail addresses is not effective. Antivirus software can only block three percent of potential breaches. So what

safeguards should be practiced and implemented to protect health care information against the hackers?

Several methods have been implemented in medical field to protect PHI are as follows:

- Training staff about hacking techniques and activities
- Implementing scheduled program for preventive maintenance
- Roles and privilages. That is, averting end users to log in with all admonistrative rights.
- Monitoring keeping the system patches and antivirus software up to date
- Encrypting and securing all networks especially wireless.
- Set up security policies with the consideration of industry best practices such as mandatory password changes and strong password rules.
- Perform security risk assessment, perform gap analysis for security breach.

According to U.S. Department of Health and Human Services' Office of Civil Rights (OCR) top three causes of data breaches in 2012 were: (2012 HIPAA Breach Statistics, 2013).

- Stolen/lost computing device (46%)
- Employee mistake (42%)
- Third party snafus (42%)

It is social engineering techniques which are being used mostly by hackers for security breaches. To avoid these security breaches employees should be trained on the various ways social engineering can be used by hackers making employees aware of each possible way of manipulation. To train the employees regarding social engineering techniques they must be given training for thirty-six ancient Chinese stratagems. I think that these thirty-six stratagems are all about social engineering. Thirty-six stratagems are thirty-six Chinese proverbs which were used by the ancient Chinese emperors during the wars.

The thirty-six stratagems are: (Verstappen, 1999)

1. Fool the Emperor to Cross the Sea
2. Besiege Wei to Rescue Zhao
3. Kill with a Borrowed Sword
4. Await the Exhausted Enemy at your Ease
5. Loot a Burning House
6. Clamor in the East, Attack in the West
7. Create Something From Nothing

8. Openly Repair the Walkway, Secretly March to Chencang
9. Observe the fire on the Opposite Shore
10. Hide a Dagger Behind a Smile
11. Sacrifice the Plum Tree in Place of the Peach
12. Seize the Opportunity to Lead a Sheep Away
13. Beat the Grass to Startle the Snake
14. Borrow a Corpse to Raise the Spirit
15. Lure the Tiger Down the Mountain
16. To Catch Something, First Let It Go
17. Toss out a Brick to Attract Jade
18. To Catch the Bandits First Capture Their Leader
19. Steal the Firewood from Under the Pot
20. Trouble the Water to Catch the Fish
21. Shed Your Skin Like the Golden Cicada
22. Shut the Door to Catch the Thief
23. Befriend a Distant Enemy to Attack One Nearby
24. Borrow the Road to Conquer Guo
25. Replace the Beams with Rotten Timbers
26. Point at the Mulberry but Curse the Locust Tree
27. Feign Madness but Keep Your Balance
28. Lure Your Enemy Onto the Roof, Then Take Away the Ladder
29. Tie Silk Blossoms to the Dead Tree

30. Exchange the Role of Guest for That of Host

31. The Strategy of Beautiful Women

32. The Strategy of Open City Gates

33. The Strategy of Sowing Discord

34. The Strategy of Injuring Yourself

35. The Tactic of Combining Tactics

36. If All else Fails, Retreat

4.5 Social Engineering and Thirty Six Stratagems

All thirty-six stratagems can be applicable if we consider them in terms of social engineering. The meaning of social engineering itself is describing the first stratagem which is "Fool the Emperor to cross the sea." Meaning of social engineering is manipulating people, so they believe and trust in the acts.

For instance, Bill is travelling by train, and Bill wants to know where Paul lives who is sitting next to him. Bill is a stranger to Paul and is unlikely to give Bill any information. Bill told Paul that he will ask him only three questions, and he will tell Paul what Paul had for dinner. And Paul agreed, so Bill's first question was "Where did you meet your spouse?" Paul said, "In a restaurant." Second was, "What is your zip code?" Paul replied, "90036." The last question was, "What is your

birthday?" And Paul said, "Jan, 1, 1982." Now in these three questions what is common? What information did Bill obtain about the stranger within a matter of minutes? Bill could have got all his personal information as Paul's mind was busy thinking that Bill is going to ask some indirect questions which will be related to the dinner which Paul had last night. He was mentally prepared to avoid giving information about the dinner; he was so engaged in that process that he lured out all his personal information in which Bill would find his age and also the place where he lives. That is "Fool the Emperor to cross the sea." That is social engineering.

Another stratagem is "Lure the tiger down the mountain". A good cyber application of this stratagem is in the social engineering technique of baiting scenarios. Social engineering are schemes where people dangle something which is wanted by others and then wait for them to take the bait.

Sites offering a download of something like music, a new movie or an astonishingly great deal on confidential sites, auction sites, etc. are a common tactic to try to get a person to divulge information. To alleviate a person's distrust, we can see the seller has a good rating which is all crafted and planned before time.

People who get tangled in the bait can be infected with malicious software that can generate any number of new exploits against them and they may lose their money without receiving their purchased item. If they were foolish and paid with a check, they may find their bank account empty. If it was an employee who gave out something about customer the cost can be more than monetary.

Consider the recent scam email about foreigners sending an email giving you an offer of sharing their money. They ask you to lend your account number so that they can transfer their money into their account as they are moving to your country and then when they arrive at your country they will share that money with you. Suppose by chance someone had shared their account number. That foreigner can blackmail that person and that person is left with no option of saving his or her own self. Now this scenario was clearly like using the strategy of "Shutting the door to catch the thief." This could have also happened in a medical facility where a person would say that he wants to donate few million for the needy and then could come with the same scam.

Consider the example given by Johnny Long, a renowned computer security expert, in his seminars of no tech

hacking techniques where he considers the shoulder surfing techniques of hacking. To illustrate shoulder surfing techniques, Long gives the example of when he was shoulder surfing a member of the military and how he rescued himself by acting like a fool when the target suspected him.

When military members are seen in public, they are extremely conspicuous. By seeing the pictures below, he doesn't need to see a business card to realize that the gentleman is a member of the United States military.

Figure 38. No -Tech Hacking

In Figure 38 we can clearly see that the man was working with headphones on and his back turned. So Long was able to take several pictures of this soldier. As he walked, and eventually moved within the inches of this person, Long clicked the second photo above that revealed

in stark aspect his laptop screen along with the dermatologic properties of his neck.

Long was also able to view him while he typed in his credentials. He made a quick move and took another photo. He took another picture, this time with the flash on. When the camera flash fired, the person turned around abruptly and noticed Long. He quickly started rubbing his eyes pointing the camera towards himself. The person was convinced by that Long was a still learning about his digital camera and returned to his work. This was an example of Feigning "Madness but Keep Your Balance."

"If all else fails, retreat" is having exit strategy in case attack fails. It can be considered as escape scheme. Employees should be aware that a hacker might have the some kind of escape scheme if everything else fails. For example, if an employee, at a medical building caught someone dumpster diving and that employee could prove that the person was engaged in criminal activity, what can the escape strategy of that criminal be? What would have been your escape strategy as the attack failed?

A fake engagement letter with any name along with his cell number or house number can save this bad guy. Calling the cell number or house number won't help because the person verifying the information is involved in the

scheme. The employee would have been fooled, information would have been revealed, and privacy has been compromised.

This is how the stratagems are being used by the hackers to break in to the secure PHI. Medical service providers should consider all these aspects while addressing confidentiality, integrity and availability of health information. Also, the System Architecture should incorporate server farms with both an inbound and outbound firewall, an intranet and communications controls - encryption, intrusion detection, anti-malware, etc.

CHAPTER FIVE

CONCLUSION AND FUTURE ENHANCEMENTS

5.1 Conclusion

DHIPS (Discounted Health Insurance Premium Systems) addresses the rising cost of health care for the people in the US and issues which will arise in 2014 after the implementation of ACA (Obamacare). DHIPS is implemented based on Information Technology (IT). With the help of information technology DHIPS provide money saving opportunities and a healthy life to the customers. It will help both the insurer and insured or insure. Both insured and insurer can manage all the information, transactions and appointments online within the matter of the few seconds. Also the admin and insured can view, update and manage the information to manage their health and save money. This system will make it possible for the US to bring down the health care premium costs and still live a healthy life. Once the system has been identified as beneficial by US government and is approved by them, the government needs to motivate the insurance companies to implement such system. The government can reward or provide a subsidy to the insurance companies to implement this system and alleviate increasing health insurance

premiums. DHIPS is also financially viable as it is an up-grade of current client - server technologies which has been used by current health insurance service providers.

Implementation of Obamacare will increase the taxes for some business and high-income people. It is expected that the implementation of the act will lead to the savings of $ 124 billion over the ten years. This savings can be used by the government to fund subsidies for rewarding the insurance companies.

5.2 Enhancements

Mobile applications/mobile user interface can be designed and implemented to aid the effectiveness and promote better outcomes. The project is based on the information provided in ACA act, therefore various other criteria can be considered to upgrade the idea behind the project. The project also refers to the only savings described in the ACA but real world savings and costs may be incurred and can be considered. Several other limitations like the ones mentioned above can be addressed by the future work. The discounted health insurance premium systems can be further extended in terms of higher level of security. Several other security techniques can be considered and implemented. Security concerns regarding

physical security and no - tech hacking techniques can also be address if security is being comprised due to these factors. Several other journals, articles and books can be used to address the systems architecture and information security measures.

APPENDIX A

LOGICAL SCHEMA

Insurance

InsuranceCode	State	Country	Area

Location

InsuranceCode	LocationID	LocationName	LocStreetAddress
LocCity	LocState	LocZip	LocPhone
LocEmail	LocFax		

Agent

AgentID	AgentAddress	AgentCity	AgentState
AgentZip	AgentCountry	AgentQualification	AgentPhone
AgentEmail	AgentTraining		

Person

PersonID	PersonType	PersonFname	PersonLname
PersonInitial			

Employee

EmpID	EmpType	EmpGender	EmpAge

Admin

AdminID	AdminLocation	AdminSpeciality	AdminAddress
AdminCity	AdminState	AdminZip	AdminCountry
AdminPhone	AdminEmail		

Patient/Member

MemID	MemType	MemAddress	MemCity
MemState	MemZip	MemCountry	MemPhone
MemEmail	MemAge	MemGender	MemAdultInsured
MemChildrenInsured	MemHeight	MemWeight	MemDOB
MemHealthStatusAdlt	MemHealthStatusChld		

Checkup

MemID	CheckupID	PatientFname	PatientLname
PatientInitial	PatientAddress	PatientCity	PatientState
PatientZip	PatientCountry	CheckupType	PatientPhone
PatientEmail	PatientAge	PatientHeight	PatientWeight
PatientGender	CheckupTreatment	CheckupPrescription	OtherTreatments

Payment

PaymentID	PaymentAmount	PaymentDate	PaymentPurpose
MemID	PaymentType	CardID	

Card Type

CardID	CardType	CardCoName	CardHolderName
CardAddress	CardCity	CardState	CardZip
CardCountry	CardNumber	CardPin	CardIssueDate
CardExpDate			

Offers

LocID	PlanID	NumberOfPlans	Date
LocStdOfLvg			

Providers

ProviderID	ProviderType	TypeID	NoOfProviders

Employers

EmpID	EmpName	EmpAddress	EmpCity
EmpState	EmpZip	EmpCountry	EmpPhone
EmpEmail	MemFname	MemLname	MemAddress
MemCity	MemState	MemZip	MemCountry
MemPhone	MemEmail	MemAge	MemGender
MemHeight	MemWeight	NoOfInsureAdult	NoOfInsuredChildren
MemHealthStatusAdt	MemHealthStatusChld		

Period

PlanID	ProviderID	PlanBeginDate	PlanEndDate

Number of Agent

PersonID	PlanID	NoOfAgent	AgentBeginDate
AgentEndDate			

Visit

VisitID	VisitDate	VisitTime	VisitReason
ProviderID	MemID		

Customer

CustID	CustType	Date	NumberOfCust

ProviderType

TypeID	TypeName	TypeCategory	TypeQualification
TypeAwards	TypeSpecialization	TypeAddress	TypeCity
TypeState	TypeZip	TypeCountry	TypeEmail
TypePhone	TypeFax		

Plans

PlanID	PlanName	PlanMonthlyPremium	PlanDeductible
PlanCopayMax	PlanPrescription	PlanOfficevisit	PlanType
PlanOutOfPocketMax	PlanPreventiveCareEx	PlanMammoandGyn	PlanHospitalization
PlanLab	PlanXray	PlanEmergency	PlanMaternity
PlanGenericPrescptn	PlanBrandPrescptn	PlanDental	PlanLife
PlanVision	DentalID		

Dental Plans

DentalID	PlanType	MonthlyPremium	Deductible
CalenderYearMax	AdultCleaning	CompositeFilling	Crown
MolarRootCanal	OsseousSurgery	PerioRootPlanning	Completedentureupper
SingleToothExtraction	CompleteBony	AdultOthodontics	ChildOthodontics
LocalAnesthesia			

Claims

ProviderID	ClaimID	ClaimCopay	ClaimTotalCharge
ClaimPlanType	ClaimPatientFname	ClaimPatientLname	ClaimPatientAddress
ClaimPatientCity	ClaimPatientState	ClaimPatientZip	ClaimPatientCountry
ClaimPatientPhone	ClaimPatientRelation	ClaimInsuredFname	ClaimInsureLname
ClaimInsuredAddress	ClaimInsuredCity	ClaimInsuredState	ClaimInsuredZip
ClaimInsuredMemID	ClaimAmountPaid	ClaimBalanceDue	ClaimOtherInsurance
ClaimBenefitPlan	ClainDateOfService	ClaimNameOfService	

APPENDIX B

DATABASE DESCRIPTION

Insurance

Field	Type	Key	Null	Description
InsuranceCode	Integer	Primary Key	No	Code for the company
State	Varchar			Name of state
Country	Varchar			Name of counrty
Area	Varchar			Area is rich or poor

Location

Field	Type	Key	Null	Description
InsuranceCode	Integer	Primary Key	No	Company code
LocationID	Integer	Primary Key	No	Location ID
LocationName	Varchar			Location Name
LocStreetAddress	Varchar			Address
LocCity	Varchar			City name
LocState	Varchar			State name
LocZip	Integer			Area code
LocPhone	Numeric			Phone number
LocEmail	Varchar			Email address
LocFax	Integer			Fax number

Agent

Field	Type	Key	Null	Description
AgentID	Integer	Primary Key	No	Agent ID
AgentAddress	Varchar			Address
AgentCity	Varchar			City name
AgentState	Varchar			State name
AgentZip	Integer			Area code
AgentCountry	Varchar			Country name
AgentQualification	Varchar			Qualification of agent
AgentPhone	Integer			Phone number
AgentEmail	Integer			Email address
AgentTraining	Varchar			Any addition certification

Person

Field	Type	Key	Null	Description
PersonID	Integer	Primary Key	No	Person ID
PersonType	Varchar			Person's category
PersonFname	Varchar			Person first name
PersonLname	Varchar			Person last name
PersonInitial	Varchar			Person initial

Employee

Field	Type	Key	Null	Description
EmpID	Integer	Primary Key	No	Person ID
EmpType	Varchar			Employee category
EmpGender	Varchar			Gender
EmpAge	Integer			Age of employee

Admin

Field	Type	Key	Null	Description
AdminID	Integer	Primary Key	No	Admin ID
AdminLocation	Varchar			Location name
AdminSpeciality	Varchar			Profession
AdminAddress	Varchar			Address
AdminCity	Varchar			City
AdminState	Varchar			State
AdminZip	Integer			Area code
AdminCountry	Varchar			Country
AdminPhone	Integer			Phone number
AdminEmail	Varchar			Email address

Patient/Member

Field	Type	Key	Null	Description
MemID	Integer	Primary Key	No	Member ID
MemType	Varchar			Employer/Individual
MemAddress	Varchar			Address
MemCity	Varchar			City
MemState	Varchar			State
MemZip	Integer			Area code
MemCountry	Varchar			Country name
MemPhone	Integer			Phone number
MemEmail	Varchar			Email address
MemAge	Integer			Age
MemGender	Varchar			Gender
MemAdultInsured	Integer			Number of adults insured
MemChildrenInsured	Integer			Number of childrens insured
MemHeight	Integer			Height
MemWeight	Integer			Weight
MemDOB	Date/Time			Date of birth
MemHealthStatusChld	Varchar			Health level

Checkup

Field	Type	Key	Null	Description
MemID	Integer	Primary Key	No	Person ID
CheckupID	Integer	Primary Key	No	Checkup ID
PatientFname	Varchar			Patient first name
PatientLname	Varchar			Patient last name
PatientInitial	Varchar			Patient initial
PatientAddress	Varchar			Address
PatientCity	Varchar			City namr
PatientState	Varchar			State
PatientZip	Integer			Area code
PatientCountry	Varchar			Country name
CheckupType	Varchar			Type of checkup
PatientPhone	Integer			Phone number
PatientEmail	Varchar			Email address
PatientAge	Integer			Age of patient
PatientHeight	Integer			Height
PatientWeight	Integer			Weight
PatientGender	Varchar			Gender
CheckupTreatment	Varchar			Treatment provided
CheckupPrescription	Varchar			Prescription required
OtherTreatments				Major/minor treatments

Payment

Field	Type	Key	Null	Description
PaymentID	Integer	Primary Key	No	Auto number ID
PaymentAmount	Integer			Amount
PaymentDate	Date/Time			Date
PaymentPurpose	Varchar			Purpose of payement
MemID	Integer	Foreign Key	No	Member ID
PaymentType	Varchar			Debit/Credit
CardID	Integer	Foreign Key	No	Card ID

Card Type

Field	Type	Key	Null	Description
CardID	Integer	Primary Key	No	Auto number card ID
CardType	Varchar			Card type
CardCoName	Varchar			Company name
CardHolderName	Varchar			Holder name
CardAddress	Varchar			Address
CardCity	Varchar			City
CardState	Varchar			State
CardZip	Integer			Area code
CardCountry	Varchar			Country
CardNumber	Integer			Account number
CardPin	Integer			3 digit pin
CardIssueDate	Date/Time			Issue date
CardExpDate	Date/Time			Expiration date

Offers

Field	Type	Key	Null	Description
LocID	Integer	Primary Key	No	Location ID
PlanID	Integer	Primary Key	No	Plan ID
NumberOfPlans	Integer			Number of plans
Date	Date/Time			Date
LocStdOfLvg	Varchar			Standard of living of the location

Providers

Field	Type	Key	Null	Description
ProviderID	Integer	Primary Key	No	Provider ID
TypeID	Integer	Primary Key	No	Type ID
ProviderType	Varchar			Provider type name
NoOfProviders	Integer			Number of providers

Employers

Field	Type	Key	Null	Description
EmpID	Integer	Primary Key	No	Employer ID
EmpName	Varchar			Employer name
EmpAddress	Varchar			Address
EmpCity	Varchar			City
EmpState	Varchar			State
EmpZip	Integer			Area code
EmpCountry	Varchar			Country
EmpPhone	Integer			Phone number
EmpEmail	Varchar			Email address
MemFname	Varchar			Member first name
MemLname	Varchar			Member last name
MemAddress	Varchar			Address
MemCity	Varchar			City
MemState	Varchar			State
MemZip	Integer			Area code
MemCountry	Varchar			Country
MemPhone	Integer			Phone number
MemEmail	Varchar			Email address
MemAge	Integer			Age
MemGender	Varchar			Gender
MemHeight	Integer			Height
MemWeight	Integer			Weight
NoOfInsureAdult	Integer			Number of adult insured
NoOfInsuredChildren	Integer			Number of children insured
MemHealthStatusAdt	Varchar			Adults health status
MemHealthStatusChld	Varchar			Childrens health status

Period

Field	Type	Key	Null	Description
PlanID	Integer	Primary Key	No	Plan ID
ProviderID	Integer	Primary Key	No	Provider ID
PlanBeginDate	Date/Time			Beginning date of offerings
PlanEndDate	Date/Time			Ending date of offerings

Number of Agent

Field	Type	Key	Null	Description
PersonID	Integer	Primary Key	No	Agent ID
PlanID	Integer	Primary Key	No	Plan ID
NoOfAgent	Integer			Number of agents
AgentBeginDate	Date/Time			Work begin date
AgentEndDate	Date/Time			Work end date

Visit

Field	Type	Key	Null	Description
VisitID	Integer	Primary Key	No	Auto number for visit ID
ProviderID	Integer	Foreign Key	No	Provider ID
MemID	Integer	Foreign Key	No	Member ID
VisitReason	Varchar			Reason for visit
VisitDate	Date/Time			Date
VisitTime	Date/Time			Time

Customer

Field	Type	Key	Null	Description
CustID	Integer	Primary Key	No	Customer ID
CustType	Varchar			Type of customer
Date	Date/Time			Date
NumberOfCust	Integer			Number of customers

ProviderType

Field	Type	Key	Null	Description
TypeID	Integer	Primary Key	No	Type ID
TypeName	Varchar			Type name
TypeCategory	Varchar			Category
TypeQualification	Varchar			Qualification
TypeAwards	Varchar			Awards and recognition
TypeSpecialization	Varchar			Specialization
TypeAddress	Varchar			Address
TypeCity	Varchar			City
TypeState	Varchar			State
TypeZip	Integer			Area code
TypeCountry	Varchar			Country
TypeEmail	Varchar			Email
TypePhone	Integer			Phone number
TypeFax	Integer			Fax

Plans

Field	Type	Key	Null	Description
PlanID	Integer	Primary Key	No	Plan ID
PlanName	Varchar			Plan name
PlanMonthlyPremium	Currency			Monthly premium
PlanDeductible	Currency			Deductibles p.a
PlanCopayMax	Currency			Maiximu copayment
PlanPrescription	Currency			Prescription
PlanOfficevisit	Currency			Office visit
PlanType	Varchar			Plan type
PlanOutOfPocketMax	Currency			Maximum out of pocket
PlanPreventiveCareEx	Currency			Preventive care exam
PlanMammoandGyn	Currency			Mammogram and gyn screenings
PlanHospitalization	Currency			Hospitalization
PlanLab	Currency			Lab
PlanXray	Currency			Xray
PlanEmergency	Currency			Emergency room
PlanMaternity	Currency			Maternity
PlanGenericPrescptn	Currency			Generic prescription
PlanBrandPrescptn	Currency			Brand prescription
PlanDental	Varchar			Dental plans
PlanLife	Currency			Life
PlanVision	Varchar			Vision care
DentalID	Integer	Foreign Key	No	Dental ID

Dental Plans

Field	Type	Key	Null	Description
DentalID	Integer	Primary Key	NO	Dental ID
PlanType	Varchar			Plan type HMO/PPO
MonthlyPremium	Currency			Premium
Deductible	Currency			Deductibles
CalenderYearMax	Currency			Maximum
AdultCleaning	Currency			Adult cleaning
CompositeFilling	Currency			Filling
Crown	Currency			Crown
MolarRootCanal	Currency			Root canal
OsseousSurgery	Currency			Surgery
PerioRootPlanning	Currency			Root planning
Completedentureupper	Currency			Denture
SingleToothExtraction	Currency			Tooth extraction
CompleteBony	Currency			Bony
AdultOthodontics	Currency			Adult Orthodontics
ChildOthodontics	Currency			Child Orthodontics
LocalAnesthesia	Currency			Anesthesia

Claims

Field	Type	Key	Null	Description
ProviderID	Integer	Primary Key	No	Provider ID
ClaimID	Integer	Primary Key	No	Claim ID
ClaimCopay	Currency			Copayment
ClaimTotalCharge	Currency			Total charge
ClaimPlanType	Varchar			Plan type
ClaimPatientFname	Varchar			Patient first name
ClaimPatientLname	Varchar			Patient last name
ClaimPatientAddress	Varchar			Address
ClaimPatientCity	Varchar			City
ClaimPatientState	Varchar			State
ClaimPatientZip	Integer			Area code
ClaimPatientCountry	Varchar			Country
ClaimPatientPhone	Integer			Phone number
ClaimPatientRelation	Varchar			Relation with member
ClaimInsuredFname	Varchar			Member first name
ClaimInsureLname	Varchar			Member last name
ClaimInsuredAddress	Varchar			Address
ClaimInsuredCity	Varchar			City
ClaimInsuredState	Varchar			State
ClaimInsuredZip	Integer			Area code
ClaimInsuredMemID	Integer			Member ID
ClaimAmountPaid	Currency			Amount paid
ClaimBalanceDue	Currency			Balance due
ClaimOtherInsurance	Varchar			Other insurance
ClaimBenefitPlan	Varchar			Benefit plan
ClainDateOfService	Date/Time			Date of service
ClaimNameOfService	Varchar			Name of service

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