

# **KAMPALA INTERNATIONAL UNIVERSITY**

**DEVELOPING A COMPUTERIZED SYSTEM FOR UGANDA REVENUE**

**AUTHORITY:**

**ACASE STUDY : NAKAWA REVENUE CENTRE**

**BY**

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**SUPERVISOR APPROVAL**

This research report entitled an investigation into a call management system for a performance of a revenue authority: A case study of Uganda revenue was developed under my supervision.

Signature: .....  .....

Date: .....  .....

JOSEPH KIZITO BADA

**DECLARATION**

NAMULAWA HELLEN do declare that to the best of my knowledge and ability that this report is my own original work and has never been presented to any institution for any academic award.

**NAMULAWA HELLEN**

**BIT / 20024 / 82 / DU**

Signature: .....

Date: .....

## **DEDICATION**

I dedicate this work to my mum veronica logose,Dad baganda keneth. special dedication goes to our supervisor JOSEPH KIZITO BADA and Eng faik kasawuli who modeled me in my project from the start up to it's accomplishment thank you and colleagues for their moral, material support and encouragement that they have given me during this period.I cant forget my son Tuhame Collin,friends Tulina Winnie, mugadu Sharon, Nakilanda lydia

Mugadu Chris.thank you so much and may God bless you All.

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# CHAPTER ONE

## INTRODUCTION

### 1.0 Overview

This chapter focuses on the investigation of a call system management for revenue and looks at the background of the study, statement of the problem, project objectives, scope of the study and significance of the project.

### 1.1 Background of the Study

Uganda Revenue Authority as a national collector of tax base revenue for the government acquired a mammoth ICT infrastructure to cope with the high productivity the market demands. As such the authority has been in a pursuit of modernizing its revenue collection efficiency with the information technology factor. The management team at URA made stringent steps to address information sharing bottlenecks in their ICT base. Beginning with their head-office at Nakawa, the authority released a national tender for the provision of ICT services to enhance the old –state network at their office and Network Operational center

Computer Point won the tender with the First Krone Highband solution in Uganda. The solution was to support 4Gbps switching fabric that is the heartbeat of the nationwide operations. The design was further supported by Cisco Switch clustering technology ensuring an 8Gbps backbone switching fabric using the Catalyst 3500 series command switch. The Head-quarters as it were deserved a neat aesthetic environment; being the only Premier Distributor of the World acclaimed Marshall Tufflex Trunking Computer Point deployed the Sterling Profile One product that gave a lasting authentic design mark at the premise.

Apart from internally generated revenue, URA also receives grants from development partners like World Bank and International Monetary Fund (IMF) to finance development projects of the city. All this revenue needs to be



managed effectively for the smooth running of the City Council activities for example for infrastructure development, social economic projects on HIV/AIDS, environmental protection among others.

## **1.2 Statement of the Problem**

Currently, URA is still using a manual system for collecting and managing their revenue. The system is very slow, prone to errors and hard to quickly generate integrated reports for fast decision making. This formed the motivation for this study to provide an automated alternative to the current manual system used in revenue management.

## **1.3 Objectives of this Project**

### **1.3.1 General Objectives of the project**

The major aim of this project is to an investigation into the performance requirement for a call management system for a of a revenue authority. A case Study of Uganda Revenue Authority.

### **1.3.2 Specific Objectives of this Project**

The specific objectives of this project were to;

1. Study and investigate the processes involved in revenue management at URA.
2. create database model for current processes used to manage revenue at URA.
3. Design database for effective data management at URA
4. Develop automated report generation on the revenue collections per resource, division, and the entire for easy planning and decision making.

#### **1.4 Scope of the Study**

The project focused on the function of collection, processing and management of revenue by URA and exploring how these processes can be automated.

#### **1.5 Significance of the Study**

The project will be able to contribute to increasing awareness about the importance of automating management of revenue. The awareness will be backed by a software application developed based on the URA environment but customizable for use by other revenue management entities both Government and non-government

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 INTRODUCTION**

This chapter focuses on the documentary literature of the earlier finding. This chapter describes the analysis of a call revenue management system for URA in a data network system as viewed by different authors.

The aim of this chapter is to gather related information of approaches of collecting a voice system from a related information will mainly be extracted from published by text books, internet, previously published journals and dissertations.

#### **2.1 GENERAL REVIEW**

According to RMS (1997), Revenue Management is the application of disciplined tactics that predict consumer behavior at the micro market level and optimize product availability and price to maximize revenue growth. Revenue Management is about maximizing revenue from existing business. It's a hard management science that employs rocket-science mathematical concepts and high-powered computers to crunch gigabytes of marketing information to:

1. Accurately assess future consumer behavior under dynamically changing market conditions
2. Determine the most effective way to price and allocate inventory to reach and every future consumer, each and every day, making real-time adjustments as market conditions change, with the consumer in real-time
3. Communicate this information instantaneously to distribution and sale outlets which deal with the consumer in real-time
4. Serve as a decision-support resource for marketing and operational functions, including but not limited to: pricing, scheduling, product development, advertising, sales, distribution, human resource utilization and capacity planning. When Revenue Management was first applied in the airline

industry in the early 80's, it was applied manually. However, the enormous scope of the problem (managing tens of thousands of flight departures departing over the next year) convinced the early adopters of this practice that only through computerization could the airline capture the revenue opportunity that Revenue Management provided.

## **2.2 Revenue management systems**

According to Van(1987) [12], revenue management traditionally involves segmenting customers, setting prices and controlling capacity to maximize the revenue from a fixed capacity . The traditional revenue management model is where the seller must determine the capacity to sell in a given period before observing demand in future periods as provided by Segev *et al* (2001).

According to Belobaba (2002), a wide range of industries have joined airlines, hospitality and travel companies in embracing revenue management as an essential component of their business strategies. Large databases of consumer information developed to improve customer relationship management will provide inputs to consumer choice models, which will in turn call prices to be set based on estimates of demand elasticity.

According to Andrew (2003) [1], revenue management systems operate by periodically running forecasting and optimization along on this in order to refresh control parameters in the control reservation system and concerns have been voiced over the best way to update bid prices in the interim period between refresh points.

According to Belobaba (2002), joint optimization of price and inventory, combined with real time updates based on the most current demand forecasts and available inventory, will generate incremental revenue gains that exceed those realized to date.

According to Kimes *et al* (2003) [5], demand based pricing is underused in many service industries, because customers are believed to perceive such pricing as fair. Fencing can be highly effective in improving the perceived fairness of demand based pricing.

Andrew (2003) [1] quotes Sabre *et al.*,(1998) [8] that over booking, demand forecasting taking willingness to pay into account optimizing the mixture of fare products involved or dynamically to the point where rocket science” is now an opt descriptor collectively known as revenue management. This is from the first revenue management areas of freight engineering and many freight revenue management systems have been developed.

INTEL has also developed an asset management program, which is a single bared web based source from which the physical and configuration of data for each of the series in the e-business product and pre-production environments can be observed (Brad *et al.*, 2000).

This means that effective asset management and revenues generated can be effectively managed by one of better processes and tools with good discipline of the audience.

According to Ianelal (2004), the difficulty for revenue management does not know when and where discounts are needed to stimulate demand. Revenue management and pricing is a practical subject that is more than a management science algorithm. This means that revenue management still needs a lot of study to accommodate better decision-making and right forecasts using right prices and other variables.

### **2.3 Computerized Revenue Management**

According to RMS (1997) [7], today, most organization managers understand that they are not maximizing the revenue potential from each and every asset. They are under- utilizing their most valuable asset. In an attempt to maximize their revenue collections, most organizations implement some type of revenue

management methodology. Some organizations set global authorization levels for certain resources in their areas of location. Others assign analysts to examine the status of future business. Still others have implemented simple spreadsheet approaches to analyze resource performance. Each of these solutions captures additional revenue that would otherwise be lost.

But in fact none of these solutions allow the organization to capture the wasted revenue. This is because a number of factors limit their ability to deliver the optimal solution. First, the different number of revenue sources an organization has, require maximum attention. Second, the variations in the revenues generated from the organization's resources (for example from markets as for the case of URA ) make it impossible to assume that what took place last week will probably happen again this week(if it didn't rain on the market day last week and many traders brought goods to the market thereby increasing revenue through taxes imposed on them may be a different story when it rains on the next market day).

## **2.4 Some Case Studies of Computerized Revenue Management**

### **2.4.1 Marriot (2005): Linking Two Data Streams with Revenue Management System**

The whole can sometimes be greater than the sum of its parts. Marriott International Inc. found that to be true after it combined two revenue management systems into one. Revenue data collected by Marriott has many uses, such as predicting customer needs. But two separate revenue management systems kept the hotel chain from easily analyzing revenue data for forecasting and marketing insights generated by 62 million reservations annually at 2,800 properties. It was also expensive to operate one system for its full-service hotels and another for select-service or extended-stay facilities. And system upgrades and training typically required IT visits to hotels around the globe. They wanted to lower their cost and increase their speed to market. The new system, known as One Yield, has accomplished that. By combining the two

systems, the need for support staff is 33% lower because only one database is used and the system requires little local IT support.

Its Web and thin-client-based architecture delivers training remotely and cuts costs. But Marriott Hotel has also improved its ability to forecast changing market conditions. The system's inventory data consolidation improves planning. The upside: Marriott Hotel estimates that One Yield delivered incremental profits of \$6.7 million last year, its first full year in operation.

Marriott Hotel chose to build the system in-house because revenue management is specialized and tightly integrated with its reservation system. The IT staff used standard technologies, including a centralized J2EE(Java 2 Platform, Enterprise Edition) architecture, IBM's Web Sphere and Actuate Corp.'s reporting tool.

Marriott's decision to build a centralized system with thin-client technology at global locations puts it ahead of many others in the hospitality industry. That particular industry is not known for being aggressive on technology but that's changing as more hotels automate systems such as lighting and even supply handhelds to maintenance personnel.

A critical goal for the management of Marriot Hotel was to ensure that the project aligned with the business. By combining two systems, the IT team was also merging different methods for managing and analyzing revenue. The business side worked closely with the technical staff. The team had to decide what features to add and discard. Everybody had to compromise a little along the way and the management reports that it was one of the toughest challenges, because the ideas that came up were great ideas. Marriot's goal was to have scheduled releases of this into the future, get it running, prove success and then continue to build. One Yield has been rolled out to 1,700 properties since the end of 2003 and is gradually being installed at others. It has become

a proving ground for technologies, such as single sign-on, that will likely be extended to other systems.

#### **2.4.2 THE UGANDA REVENUE AUTHORITY (URA)**

Uganda Revenue Authority (URA) was set up on September 5, 1991(URA,1991) as a central body for the assessment and collection of specified tax revenue, to administer and enforce the laws relating to such revenue and to account for all the revenue to which those laws apply. The Uganda Revenue Authority is also required to advise the Government on matters of policy relating to all revenue.

Uganda Revenue Authority is charged with the responsibility of providing the foundation for development through revenue mobilization and management to:

1. Finance current and capital development activities.
2. Increase the standard of living of all Ugandans and reduction of poverty;
3. Increase the ratio of revenue to GDP, to a level at which Government can - fund its own essential expenditure. The above objectives can be achieved by identifying taxpayers and informing the tax payers of their tax rights and obligations by providing them with - necessary information; Assess the taxpayer fairly with regard to those taxes relevant to them; Collect the taxes in accordance with the law and related regulations and practice; Account for the taxes collected in accordance with the statute; and enforce collection of taxes where default has occurred.

Departments in URA responsible for revenue management have District Revenue Offices in various towns. URA mission is maximizing central government tax revenue while optimizing resource utilization by ensuring a fair and equitable tax administration with a highly motivated and professional staff.

In order for URA to increase and properly manage the revenue, there is need to;

1. Provide the taxpayers and their authorized agents with clear, precise and timely information.
2. Ensuring that courtesy and considerate treatment are extended unconditionally to all taxpayers.



3. Responding expeditiously to every taxpayer's enquiry, complaint or request.
4. Explaining the grounds for and derivation of every tax assessment.
5. Providing proper technical advice to the taxpayer on requests about tax implications.
6. Assisting new taxpayers to register.
7. Educating the taxpayers and the general community about tax obligations and rights, objections and appeals
8. We should normally give prior notice to any taxpayer whose premises are to be inspected or upon whom an audit is to be conducted.
9. Tax records are maintained up to date and Tax credits are processed promptly and properly accounted for.
10. Providing high quality public relations at all levels of the Authority.
11. Accepting criticism, advice at all times, receiving and acting promptly on all genuine complaints made in good faith against URA revenue management system.

It is the obligation of the taxpayer to ensure that he/she is registered and obtains a Tax Identification Number (TIN), which is issued free to every applicant and is the unique identifier for all tax purposes. Income Tax payers are required to register for Income Tax and obtain an Income Tax File number. Taxable persons for VAT purposes are also required to register for VAT and obtain a VAT registration number.

## **2.5 THE BENEFITS OF COMPUTERIZED REVENUE MANAGEMENT**

According to RMS (1997), the ultimate benefit of computerized revenue management is increased revenue. Each resource for the organization is managed to ensure that it generates the maximum possible revenue. You can expect this system to generate anywhere from 3% to 8% additional revenue for your business, resulting in potential profit increases of 50%-100%. Of course, your level of improvement depends upon how revenue management was utilized at your business prior to the implementation of the computerized system. At the same time, management benefits from an effective revenue management system. Management gains a decision-support resource for

marketing and operational functions. Having at their disposal a tool that can analyze historical and forecast future behavior is invaluable when planning marketing campaigns, and pricing and schedule changes.

New analysts can become effective more rapidly when they have a reference tool that helps them understand the relationship between historical and future behavior. Without such a tool, the analyst only learns about the business' behavior through extensive experience. The analysts gain a tool that helps them focus their attention where it is needed, when it is needed. A tool that can provide them the confidence to make the right decision while enabling them to apply their own knowledge and abilities to the maximum benefit.

According to Saleemi, (1997), the timing aspect of information is very important, because late information is better than no information. Automatic processing as provided by the electronic a system quickens the operations on the input data to produce timely information. He states further that the degree of accuracy and preciseness of the information is increased by the use of mechanical or electronic data processing tools, which remove the use of hand written entries. Automatic processing is the process of keeping the data in a safe place and retrieved when required.

According to Wallace (1987), automatic processing is information that is recorded in some form, stored in a system and retrieved in a manner. A record is any piece of information put aside for further use or reference. As per this study, the records include various revenue sources and collections made from different sites.

According to Harrison (1996), an important function of the office is the filing and finding of information, which may be held on paper, disk or film and to ensure quick and reliable access to it. He states further that electronic data storage has revolutionaries the speed of retrieval and allowed greater and

easier access to vast quantities of records without the need to store papers in bulky shelves. According to Connolly (1996:12), when data is isolated in separate files, it becomes more difficult to access it.

### **2.5.1 PROBLEMS OF IMPLEMENTING ONLINE REVENUE MANAGEMENT SYSTEMS**

Like any other management information system, implementing an online Revenue management system poses a lot of challenges to the organization and among these we have;

1. The need for a lot of financial support. Much as the organization is certain of benefiting from the results of implementing their revenue management processes online, it needs a lot of funds to support such projects. Even when the system is operational, it will need financial support to maintain it.
2. Security of the organization's information. Once the organization implements an online revenue management system, then, the information concerning their revenue matters becomes prone to unauthorized access. This means that the organization will need to set up enough security measures both physical and logical security to the implemented revenue management system.
3. Need for more technical expertise. Much as the staff members of the organization may be used to executing the processes involved in revenue management in their organization, there will be a need for technical support to run the revenue management system implemented for example the system and database administrators which may not be present in the organization before the revenue management system is set up.
4. The need for the infrastructure. The organization may need to create more space for example construction of server rooms, offices for the new technical staff and any other physical infrastructure for the system.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

This section explains the methods that were used in the study of the existing system, analyzing and designing the proposed revenue management system for URA.

#### **3.2 Data collection techniques/tools used in studying and investigating The existing system**

##### **3.2.1 INTERVIEWS**

This involved interviewing Uganda Revenue Collection Department officials and other relevant persons in different divisions on information concerning revenue collection processes and sources. Through the interview, the researcher will give chance to the respondent to ask all relevant questions concerning the topic of the study. This gave the researcher an advantage of getting first hand information from the respondents who were already part of the system under study.

##### **3.2.2 REVIEW OF EXISTING DOCUMENTATION.**

Document review was used to understand the current system and get relevant literature on the revenue management techniques that will be used the time the study will be done. A number of documents will be reviewed ranging from invoices, payment receipts, order papers, and delivery notes in addition to reports generated on different divisions and head quarters.

This also acted as a basis on which to validate the information obtained from the interviews.

### **3.2.3 OBSERVATION TECHNIQUE.**

Observation technique helped the researcher to physically observe the process of involving in revenue collection, and the characteristics of these processes for example the speed of information flow and the number of personnel involved.

### **3.2.3 TOOLS USED IN ANALYSIS AND DESIGN OF THE SYSTEM**

After collecting data about the existing system at URA, the researcher will make use of the following tools to analysed and design the new system;

#### **3.3.1 ENTITY RELATIONSHIP DIAGRAM**

The E-R Diagram was used in data modeling to set up an entity relational model of the system.

This involved determining the relationships between the various entities in the system and associating these entities with their attributes and attribute domains.

#### **3.3.2 DATA FLOW DIAGRAM**

The Data Flow Diagram (DFD) was used to model the processes involved in the system to show how data flows into and out of the system in a top-down manner by giving a graphical representation of a system's components, processes and how they interface with each other.

### **3.4 TOOLS WHICH WILL BE USED IN DEVELOPMENT AND IMPLEMENTATION OF THE SYSTEM**

1. A scripting language (PHP in particular) embedded in HTML was used to develop graphical user interfaces (GUIs) that the users would interact with while logically interacting with the server.

2. MySQL database management system will be used in setting up a server based database for data storage and querying to generate reports like summaries on revenue collection by type, month and also pending payments.

## **CHAPTER FOUR**

### **STUDY AND INVESTIGATION AND REQUIREMENTS DISCOVERY**

#### **4.0 INTRODUCTION**

Using the data collection methods stated in the methodology in Chapter 3, the following information about revenue management in URA was obtained. URA is divided into five divisions namely:

Kawempe, Nakawa, Central, Makindye and Rubaga. With in each division there are a number of resources that generate revenue for the city council. Some URA revenue resources are tendered by companies while others are managed by the URA revenue collection officials from the various divisions. The tendering companies collect revenue from these resources on behalf of URA and submit records on revenue collection to the URA for a given period of time (either daily basis or monthly basis depending on the agreement between the firm and URA).

Generation of revenue collection reports at URA is done by considering collection per resource per division. The revenue collection report displays the resource identification, where it is located and how much was collected on which date.

#### **4.1 URA'S SOURCES OF REVENUE.**

URA has a number of source of revenue that include Graduated tax, Markets, Trading license, Tax Parks, Funding Agencies, Street Parking, Properties like ground rent and property rate value. The process involved in revenue collection varies from one resource to another.

#### **4.1.1 GRADUATED TAX COLLECTION**

This is in form of arrears, current, surcharge, fees from appeal and replacement of lost ticket.

(a) Arrears - If the Graduated tax payer had some Graduated taxes not paid for the past 15 years.

(b) Current - The graduated tax of the current year.

(c) Surcharge - If the Graduated taxpayer has delayed to pay the G/tax of the current year, then he must pay extra 50% of the G/tax.

(d) Fees from appeal - If the G/tax payer is not satisfied with the assessment of his property and determination of the G/tax he is supposed to pay, he submits an appeal with a fee for appeal.

(e) Replacement of ticket - If the G/tax payer has lost the ticket and needs a new G/tax ticket, then he must pay for the replacement.

#### **4.1.2 Property Tax.**

This is charged on every building within the boundaries of the City Council. It involves property rates (value) and ground rent. The purpose of this tax is to help URA in providing services to residents like road network, street lighting, garbage collection, health services, spray of mosquitoes among others. The valuers of the property use their evaluation techniques to come up with the taxable income from the property. Ground rent is payable by people who occupy City Council land by getting a lease premium (5-49 years).

#### **4.1.3. Market Charges.**

These include charges from stalls and lockers specifically from people who trade in the markets. This activity is normally contracted out through tendering process and the tenders normally go up to 3 years. Some of the markets which URA collects taxes include among others Owino- St. Balikuddembe, Nakasero, Sawuliyako, Bukoto, Bugolobi, Kalerwe, Kasubi.

#### **4.1.4. Taxi /Bus park fees.**

The collection of the fees from these two resources is tendered and currently UTODA (Uganda Taxi Operators and Drivers' Association) is in charge of collecting fees from taxi parks and UBOA (Uganda Bus Owners Association) is in charge of collecting fees from the bus park. These two associations must submit revenue collected for a given period to the divisions revenue office.

#### **4.1.5. Street Parking.**

To park your vehicle on the street under URA, you have to pay some fee depending on the time you spend parking. All these fees generate revenue for URA. This collection of street parking fees is normally tendered out to companies and currently; Multiplex Limited. The company that gets this tender must submit revenue collection records to the divisions' revenue offices for a given period of time depending on their agreement with URA.

#### **4.1.6 Trading License.**

Everybody running a business within boundaries of URA (whether a shop, private school) must operate the business under a URA Trading License. The trading license fee depends on the size of the business. URA elects a team from their staff to handle this task of moving from business to business checking for possession of the trading license. The business person may obtain the trading license after paying the trading license fee to division's revenue offices.

#### **4.1.7 Funding Agencies.**

URA normally receives donations from funding agencies to support projects running in divisions. The funds donated to URA are distributed to different divisions which act as a source of revenue to the divisions.



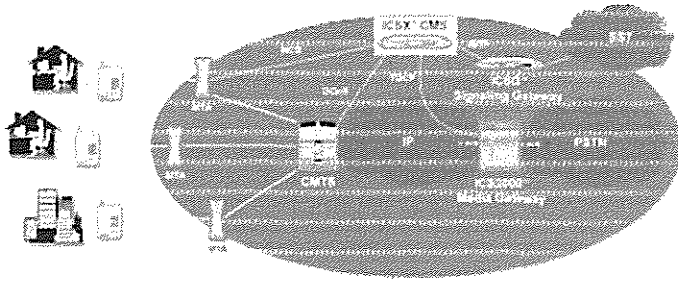
## **4.2 WEAKNESSES IN THE EXISTING SYSTEM**

1. The process of generating revenue reports consumes a lot of time as all this is done manually.
2. The process of recording the revenue collections takes a long time for example when a person comes for replacement of a graduated tax ticket, i.e. takes a significant amount of time to check whether that person is a true owner of the lost ticket, whether that person really has no arrears he is supposed to pay or determination of the surcharge on the G/tax if need be.
3. The co-ordination between the URA head office and the divisions' revenue collection department is poor. For a person at the headquarters to access information about revenue collections he must either send an office messenger or call directly to the division. Similarly, submission of reports to the head office by the divisions' revenue officers would need a person to travel there. This takes a significant time in the organization process of URA

## **4.3 ICSXT CALL MANAGEMENT SERVER**

The ICSX Call Management Server (CMS) is a Packet Cable compliant CMS platform focused on the delivery of primary line CLASS 5 voice services over packet-based hybrid fiber-coaxial (HFC) networks.

A highly cost-effective solution for cable operators seeking to add voice to their service bundle, the ICSX provides full call agent, gate controller, media gateway controller, and announcement controller functionality as defined in the Packet Cable architecture.



**Figure 1 showing a call management server over voice control**

Delivering revolutionary scale, performance and economics, the ICSX CMS operates in cable telephony networks and interoperates with a wide range of other Packet Cable-based products to ensure the rapid delivery of voice services. With support for regulatory and CLASS features, the ICSX CMS meets the requirements for cable operators to deliver primary line Voice over IP services.

#### **4.4 THE CABLE TELEPHONY SOLUTION**

Convergent Networks' Cable Telephony Solution leverages deployment-hardened components, including the ICS2000™ media gateway, the ICSX™ call management server, the ICSP™ tandem proxy, the ICSG™ signaling gateway and the IC View management system. Deployed in carrier networks for over two years, our systems have proven PSTN experience and carry more than 3 billion minutes of live traffic per month.

The platform fully complies with Packet Cable 1.0 and 1.1 specifications, and is also designed to support Packet Cable 1.2 and 2.0, which offer superior performance, scale and enhanced application integration.

#### **4.5.PRIMARY LINE SERVICES**

The ICSX CMS supports all requirements for cable operators who choose to deliver primary line services, including E911, operator services and busy line interrupt, CALEA, warm dial-tone and local number portability. Further, the ICSX supports all basic and enhanced features as defined by Packet Cable specifications.

#### **4.6 ADDITIONAL REVENUE OPPORTUNITY**

The ICSX allows cable operators to leverage new IP applications and service creation environments from multiple vendors to create enhanced and revenue-generating voice services. With support for CMSS and SIP, the solution provides an immediate opportunity for carriers to deliver enhanced applications and premium service offerings, such as carrier hosted IP PBX, IP VPN services, advanced messaging and conferencing services.

#### **4.7 STANDARDS COMPLIANCE**

Based on Packet Cable specifications, the ICSX supports NCS, DQoS, TGCP, Event Messaging, ISTP, Security, and both Basic and Enhanced residential features.

- The call agent function of the ICSX provides signaling services using the NCS protocol to Media Terminal Adapters (MTAs) at the customer premise.
- The gate controller function coordinates quality of service authorization and control using the DQoS specification.
- The media gateway controller manages signaling to PSTN Gateways, such as the ICS2000 media gateway
- The announcement controller function manages network announcement servers.

In addition to these functions, the ICSX provides CLASS features, call routing and other call services to provide a complete Class 5 softswitch solution for voice over cable services. The ICSX supports extensive PacketCable-based third-party interoperability, allowing cable providers to choose best-of-breed equipment for maximum network flexibility.

#### **4.8 HIGH SCALABILITY AND DENSITY**

As cable operators grow their networks and add customers, they must be able to scale their systems to meet demands in the market. The ICSX CMS addresses both small and large deployment needs with industry leading scale and density, and unparalleled price and performance. The ICSX can support more than 40,000 subscriber lines in two rack units of space, allowing cable operators to increase subscriber lines without increasing operational costs.

Further, the complete solution, scales in modular, cost effective increments to provide support from 5,000 to more than 100,000 Packet Cable subscriber lines in a single seven-foot telcorack.

#### **4.9 HIGH AVAILABILITY**

The high-performance capabilities of the ICSX CMS can withstand the demands of carrier-class voice networks, providing a carrier-grade platform for robust and reliable voice service delivery. The ICSX provides extreme high-availability through Active – Active redundancy. Call state, subscriber and line information are mirrored in the redundant nodes to support call preservation during rapid and automated fail-over.

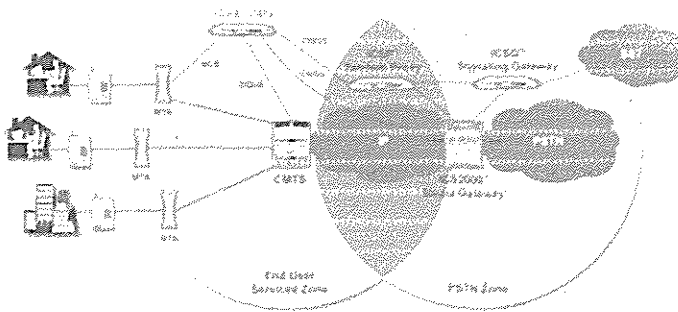
Implemented from the ground up for carrier-class availability, all components exceed Telcordia availability recommendations for

telephony systems.

#### 4.10 SIMPLIFIED ELEMENT MANAGEMENT AND BILLING

The IC View management system, which includes the IC View Element Management System (EMS), the IC View Billing Mediation Platform (BMP) and the IC View Subscriber Management Portal (SMP), provides a common and centralized operational view for cable operator network administrators.

IC View enables conversion of Packet Cable event messages (EM) into any format required, such as Telcordia Technologies' Automatic Message Accounting (AMA) format based on GR-1100, GR-1083 and GR-508. Common open northbound interfaces, such as XML, SNMP V1/3 and TL1, facilitate tight integration with the cable operators' OSS to ensure back office interoperability for fast service deployment.



**Figure 2** showing simplified element Management and billing

#### **4.11 The Convergent Networks Advantage**

At Convergent Networks, our cutting-edge technology is helping guide service providers to the next generation of broadband communications. Unmatched in its scalability and versatility, our solution supports PacketCable-based networks and allows converged service delivery over broadband networks. Our commitment to providing a complete solution to ensure cable operators' success is further extended by a comprehensive portfolio of professional and technical support services.

#### **4.12 ICSXT CMS Specifications**

##### **4.12.1 Server Platform**

Sun Netra120 or Netra20 platforms, Solaris 9, NEBS certified

##### **4.12.2 Protocols**

Signaling: NCS Call Agent, TGCP Media Gateway Controller, MGCP, SIP, CMSS

Quality of Service: DQoS, COPS

Security: IPsec / IKE-, PKInit, Kerberos, Radius

SS7: ANSI ISUP

Service Environment: IN, AIN

#### **4.12.3 Availability**

Meets or exceeds GR-1110-CORE requirements. 1:1 Active – Active redundancy or 1:N cluster, all stable calls maintained on CMS failure, Non-disruptive software upgrades and serviceability

#### **4.12.4 OAM&P**

SNMP v1/V3, XML / SOAP, HTTP

#### **4.12.5 Billing**

PacketCable EM, Automatic Message Accounting (AMA) format based on GR-1100, GR- 1083 and GR-508

#### **4.13 Features**

Packet Cable PKT-TR-VoIPBRF-000608 Basic Residential Features, including Calling Number Delivery, Calling Name Delivery, Calling Identity Blocking (\*67/\*82), Calling Identity Delivery on Call Waiting, Call Waiting, Cancel Call Waiting (\*70), Call Forwarding Variable and Usage Sensitive Call Forwarding (\*72/\*73), Call Forwarding Busy Line (\*68/\*40/\*88), Call Forwarding Don't Answer (\*68/\*42/\*88), Selective Call Forwarding (\*63/\*83), Selective Call Rejection (\*60/\*80), Automatic Recall (\*69), Automatic Callback (\*66), Visual Message Waiting Indicator (CPE Light and Stutter Dial Tone), Customer Originated Trace (\*57), Three Way Calling and Usage Sensitive Three Way Calling (\*71), Distinctive Ringing / Call Waiting (\*61/\*81), Speed Calling (\*74/\*75),

PacketCable PKT-TR-VoIPERF-00831, including Residence Distinctive Alerting Service, Remote Activation of Call Forwarding, Call Forwarding Combination, Outside Calling Area Alerting, Line Service Restriction, Do Not Disturb, Curfew on Calls, Calling Identity with Enhanced Screening, No Solicitation Announcement, Anonymous Call Rejection (\*77/\*87), Automatic Callback Restrict, Automatic Call Blocking

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QoS is more in demand on corporate LANs, private networks and intranets (private networks interconnecting parts of organizations) than on the Internet and ISP networks. For example, you are likely to see QoS being deployed over a campus where students in dorm play half-life over the campus LAN, thereby congesting the network and hindering traffic for other more important types of data. QoS deployment in this case can favor traffic more the more important office data at the detriment of trivial network gaming, without however killing the latter. On the other hand, surfing the global Internet, there is most of the time no real QoS (unless your ISP has deployed QoS mechanisms). So, how quick you draw audio, text or video traffic generally depends on the bulk of the media. Text comes first, naturally. If your ISP provides QoS for, say, favoring voice, your voice reception would be great, and depending on your bandwidth, other media types might suffer.

QoS is an important tool for VoIP success. Through the years QoS mechanisms have become more and more sophisticated. Now, you can have QoS mechanisms for small LANs up to giant networks.



## **What is Quality?**

In networking, quality can mean many things. In VoIP, quality simply means being able to listen and speak in a clear and continuous voice, without unwanted noise. Quality depends on the following factors:

- Data loss
- Consistent delay characteristics (called jitter)
- Latency, leading to echo

Read more on VoIP voice quality: [Factors affecting VoIP quality?](#)

## **What is Service?**

Service can mean many things in networking, as it carries some ambiguity in meaning. In VoIP, it generally means what is offered to consumers in terms of communication facilities.

## **Bandwidth**

As I mention so many times, the very first thing you need to guarantee in order to guarantee quality for VoIP is adequate bandwidth. And this is one of the greatest challenges in networks today: how to achieve good voice quality with limited and often shared bandwidth. This is where QoS comes into play.

Example: Your organization deploys VoIP over a private LAN, which also accommodates other types of data - for surfing, downloading, faxing, and sometimes playing LAN games (especially when you, the boss, are not around) etc. You can take advantage of QoS to favor one of those classes of services over the others depending on your needs. For instance, if you want great VoIP quality, even if this means sacrificing other data types, then you can tweak QoS settings such that voice data is favored through the network.

## VoIP Bandwidth Calculators

To be able to determine whether the bandwidth you have is fit for VoIP, you can have your bandwidth calculated. There are many places on the web where you can have this done for free, here for example.

## How to Achieve QoS?

On a personal (small scale) level, QoS is set at router level. If you want to enforce QoS policies in your network, make sure you use a router which is equipped with QoS software, which you can use to configure the quality of service you require.

If you are an individual user, then there is a great chance that your VoIP service provider already implements QoS on their server, though this is not always the case. This way, the QoS configurations will be such that they favor voice over other data types. But then, since you will be using an Internet connection from a provider of another type (your ISP), the effect is somewhat diluted; unless you implement QoS on your ATA or router

## System Requirements

### 1. Software Requirements.

Software Component	System Requirement
Operating system for the server	Linux, windows NT,2000,2003
Operating system for the client PCs	Linux, Windows NT,2000,XP
Web server	Apache Web server version 3.1
Web browser	MS Internet Explorer 6.0 or above
Data base management system	Mysql Server Version 3:23.48- Max Log

## 2. Hardware Requirements.

Hardware Component	System Requirement
Processor	Intel Pentium III or above
Processor speed	800 MHZ or above
Memory	128 MB RAM or above depending on the Operating system
Disk Space	10 GB or above
Bandwidth	100 MBps

### System Design

#### Introduction

The researcher approached the design of the system by modeling the processes and data involved in the system.

#### Process Modeling

The researcher identified the processes with their inputs and outputs in the system, the external entities involved in the system and put them together to build a Data Flow Diagram (DFD) that helped to show the flow of data in the system.

The following are the symbols used to design the DFDs.

Figure 5.1: Symbols used in the design of DFDs

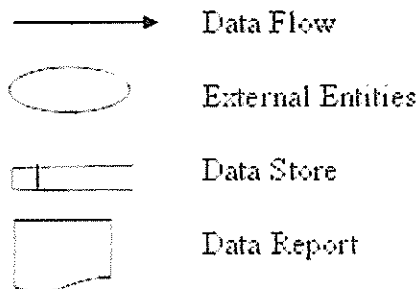


Figure 5.1: Symbols used in the design of DFDs

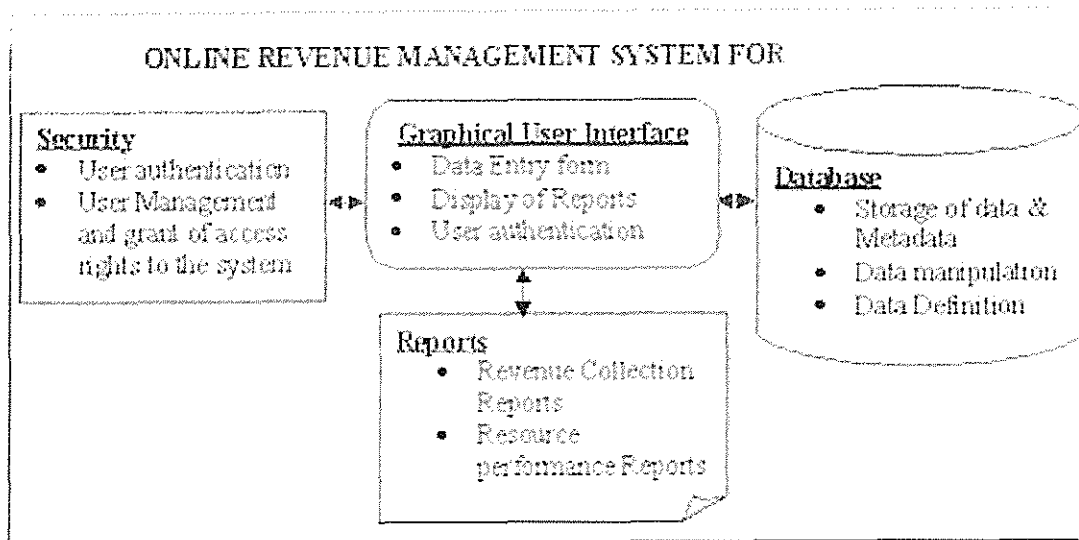


Figure 5.8: Architectural Design for a call Revenue Management System for URA

## Data Modeling

### 1. Data Requirements

The researcher used the results of the existing system to come up with the data requirements that state the data to be modeled and the conditions that must hold over this data.

The following are the data requirements for the data to be modeled;

- URA has a number of Revenue Resources namely Graduated tax, Property tax, Market charges, Tax/Bus park fees, Street parking and Trading License.
- Each division has at least one of the above categories of revenue resource and each revenue resource has different characteristics from others in URA. Information kept about a division includes division ID, the division name and address. Each of the five divisions of URA is uniquely identified by its ID.
- Information about Graduated tax includes; Graduated tax ticket Identification, Division ID, ticket number, collection date, ticket holder name and address and amount paid. The ticket expires within the year it was issued. A combination of the Division ID, year and graduated tax ticket number forms the graduated tax ticket identification which uniquely identifies a collection made from the graduated tax revenue resource in URA.

(d) Information kept about property tax includes Property tax identification, Property Rate Value, Ground Rent Value, ID of the division where the property is located, Property Number and Property Owner, location, and the collection date. The property tax expires with in the year when it is paid. The combination of Division ID, collection date, and Property Number forms the property tax identification which uniquely identifies a property tax collected in URA.

(e) Information kept about Market Charges includes market identification, Division ID, Market Name, Identification of Company tendering the market, amount collected, and date of collection. The combination of Division ID, Market Name and Date of collection forms the market identification which uniquely identifies a collection made from the market in URA.

(f) Information kept about Taxi/Bus Parks fees includes park identification, Division ID, Identification of Company tendering the Taxi/Bus Park, Name of the Taxi/Bus Park, Date of collection and amount collected. The combination of Division ID, Name of Tax/Bus Park and Date of collection forms the park identification which uniquely identifies a collection made from a Taxi/Bus Park in URA.

(g) Information kept about Street Parking includes street identification, Division ID, Identification Company of tendering the Street Parking Revenue collection, Date of collection, and amount collected as well as Street Name. The combination of Division ID, Street Name and Date of collection forms the park identification which uniquely identifies a collection made from street parking in URA.

(h) Information kept about Trading License includes license identification Division ID, License Number, collection date, Name of holder and address, business name, and amount paid. Trading License expires with in the year when it is paid. A combination of Division ID, License Number and year of issue forms the license identification which uniquely identifies a Trading License collection made in URA.

(i) Information kept about Donations includes Donation Identification, Division ID, Funding Agency Name, Donation Date, Amount donated. The Donation

# 1. Modeling the Level 1 DFD for a call Revenue Management System for URA.

The whole system depicted in the context diagram above is made up of different processes that work together to achieve the goals for a call Revenue Management System for URA.

The following are the processes that make up the above system;

- (a) Register Revenue Resource
- (b) Register Revenue Collection
- (c) Determine General Revenue Performance.
- (d) Generate Revenue Report.

The model of the Level DFD is shown below;

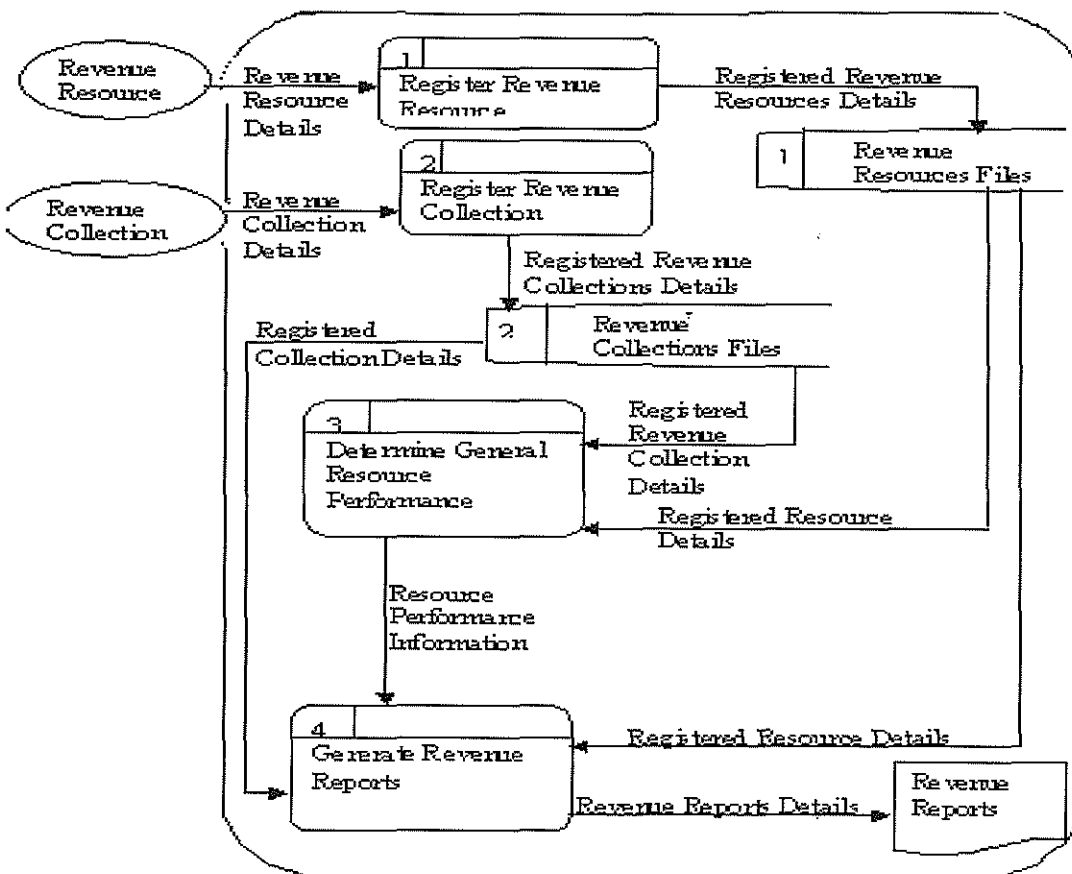


Figure 5.2: Context Diagram depicting the a call Revenue Management System for URA

### 3. Data Dictionary for the Level 1 DFD.

The researcher provided a dictionary for the processes, the data stores and data flows involved in the system as shown in the tables below;

Process Name	Description
1. Register Revenue Resource	Registers a revenue resource into the system by taking resource details as its inputs and stores the revenue resource details into revenue resource files.
2. Register Revenue Collection	Registers a revenue collection made by the revenue collection agent from a revenue resource and stores the revenue collection details into Revenue Collection Files.
3. Determine General Resource Performance	Inputs details of a revenue resource and the collections made from it and determines its performance in rank (for a given period) per revenue resource, division and stores the performance into the Resource Performance Files.
4. Generate Revenue Reports	Inputs Resource details and collection details as well as resource performance and generates reports that indicate the revenue collected from each resource on a given date in detail (without showing specifically the performance).

Figure 5.4: Table for Processes in the DFD

#### (b) Data Stores

Data store Name	Description
1. Revenue Resource Files	Stores information about a resource or the outputs of the 'Register Revenue Resource' Process
2. Revenue Collection Files	Stores the outputs of the 'Register Revenue Collection' process which are the details about a collection made.

Figure 5.5: Table for Data Stores in the DFD

(c) **Reports.**

**Revenue Reports.** Display of revenue collections made from the respective revenue resources, division and in a given period.

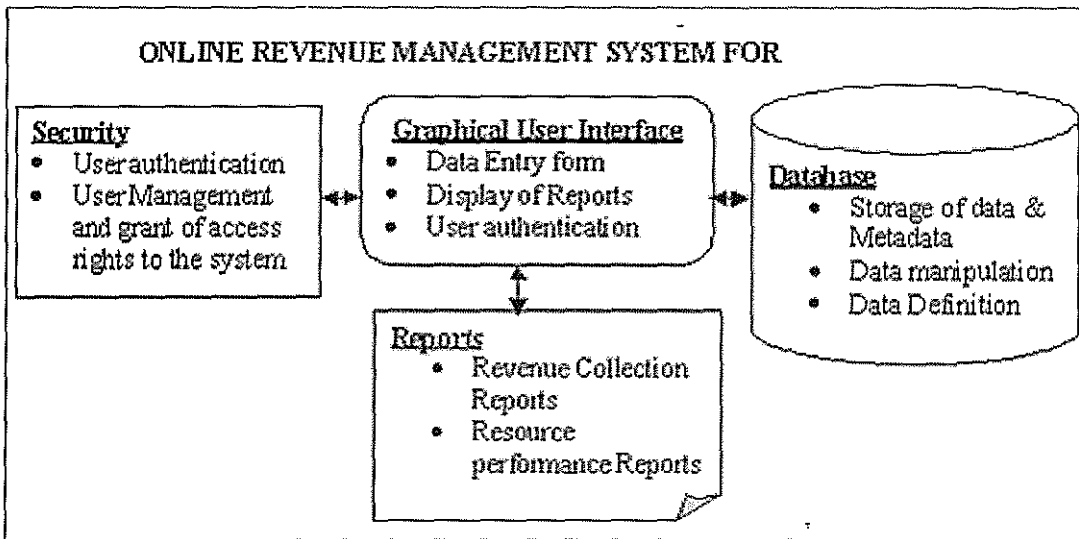


Figure 5.8: Architectural Design for a call Revenue Management System for URA

**Data Modeling**

**1. Data Requirements**

The researcher used the results of the existing system to come up with the data requirements that state the data to be modeled and the conditions that must hold over this data.

The following are the data requirements for the data to be modeled;

- (a) URA has a number of Revenue Resources namely Graduated tax, Property tax, Market charges, Tax/Bus park fees, Street parking and Trading License.
- (b) Each division has at least one of the above categories of revenue resource and each revenue resource has different characteristics from others in URA.



Information kept about a division includes division ID, the division name and address. Each of the five divisions of URA is uniquely identified by its ID.

Graduated Tax

Entity Name	Description	Attributes	Description
Graduated Tax	Graduated Tax collected from people in URA boundaries.	TicketID	Ticket Identification. Uniquely identifies a graduated tax ticket in URA.
		DivisionID	ID of the division from where the tax is collected
		TicketNumber	A number that uniquely identifies graduated tax ticket at the Division level
		CollectionDate	Date when the Graduated Tax revenue is collected.
		TicketHolderName	Name of person who has paid the Graduated Tax
		TicketHolderAddress	Address of the graduated tax ticket holder.
		Amount paid	Value of assessment or the amount paid by the Graduated tax ticket holder.

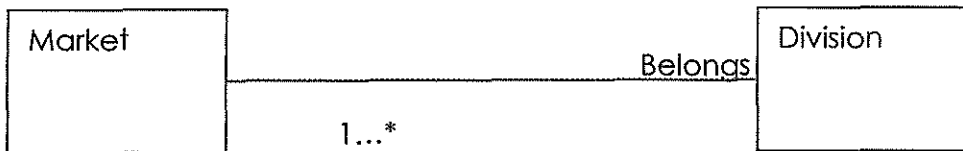
(b) Property Taxes

Entity Name	Description	Attributes	Description
Property Tax	Tax collected from the properties within the boundaries of URA like buildings.	PropertyID	Property Identification. Unique for each property in URA.
		PropertyRateValue	Amount of tax collected from people in URA due to ownership of the property in URA boundaries.
		GroundRentValue	Amount payable by people who occupy URA land by getting a lease premium (5-49 years)
		DivisionID	ID of the division where the property is located
		PropertyOwner	Name of the person who owns the property and therefore the person who pays the property tax
		CollectionDate	Date when the property tax is collected.
		PropertyNumber	A number that uniquely identifies a property at Division level.
		Location	The physical address of the property in the division.

### 3. Modeling Relationships between the Entities Participating In This System.

#### (a) The Market-Division Relationship

Figure 5.9: The Market-Division Relationship

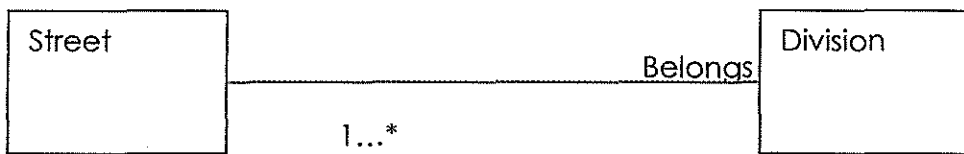


Each division has one or more markets and each market belongs to a particular division.

Thus the cardinality of this relationship is M: 1.

#### (b) The Street-Division Relationship

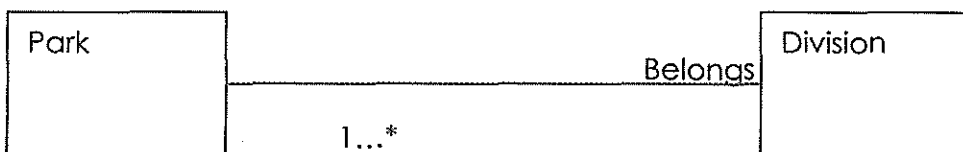
Figure 5.10: The Street-Division Relationship



Each division has one or more streets and each street is located within a particular division. Thus the cardinality of the relationship is M: 1.

#### (c) The Trading License-Division Relationship

Figure 5.11: The Trading License-Division Relationship



Each business is conducted within a particular division where it pays the trading license from and each division has one or more businesses being run with in it. Hence the cardinality of this relationship is M: 1.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.0 Introduction.**

This section discusses the achievements realized in relation to the objectives of the project, the limitations encountered during the project and is concluded by giving recommendations regarding this project.

#### **5.1 Discussion of Achievements.**

The researchers were able to achieve the project's intended objectives as follows: The users of the system are able to;

1. able to record voice mails for users who are not at their destination
2. Retrieve stored information about revenue collections made from each revenue resource in form of reports per division per resource on monthly, quarterly, bi-annually and annual basis.
3. The new call management system Rank divisions in revenue generation performance by looking at the totals generated per division on monthly, quarterly and annual basis.
4. To provide mobile profiles for users who are out of office.
5. To provide online value added tax for registration and tin numbers

#### **5.2 Limitations**

Much as the researcher was able to obtain the above achievements, a number of limitations were experienced during the project implementation as stated below;

1. During the system study, the URA staff members (who were among the target groups) to be interviewed were reluctant in giving information regarding revenue management claiming that those are 'sensitive areas' for URA. This delayed the speedy progress of the project.
2. Did not have the relevant access to confidential configuration details and files, from system administrator, for fear of exposure of company secret

### **5.3 Recommendations**

I recommend that in future if another researcher picks up interest in Revenue Management for URA or any other institution, this project should be a starting point. Future work may consider all other sources of revenue at URA although this study considered the major revenue resources only.

In future, further research should investigate on the performance of the voice nature of URA, since the call manager problems are voice related

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UGANDA REVENUE AUTHORITY NAKAWA

*Please select an item below*

Admin Log

User Log

Exit

*African Secrets  
Limited*

## Customer form

AMIMTM - Microsoft Visual Basic [design] - [frmcustomer (Form)]

File Edit View Project Format Debug Run Query Diagram Tools Add-Ins Window Help

5580, 2985 19200 x 12000

CUSTOMER FORM

General

**UGANDA REVENUE AUTHORITY (URA)**

Customers'_ID	<input type="text"/>	First_Name	<input type="text"/>
Last Name	<input type="text"/>	Status	<input type="text"/>
Subscription fee	<input type="text"/>	Address	<input type="text"/>
Gender	<input type="text"/>	Telephone	<input type="text"/>

First Record	Next Record	Save	Search	Exit
Previous Record	Last Record	Add	Delete	Cancel

◀◀ Adodc1 ▶▶



## Item form

AMIMTM - Microsoft Visual Basic [design] - [frmitems (Form)]

File Edit View Project Format Debug Run Query Diagram Tools Add-Ins Window Help

6075, 3810 19200 x 12000

ITEMS FORM

General

**UGANDA REVEUNE AUTHORITY**

Items\_ID  Item Description

Item Name  Cost\_Price

Item type  Manufacturing Date 6/21/2010

First Record	Next Record	Save	Search	Exit
Previous Record	Last Record	Add	Delete	Cancel

◀ ◁ ▷ ▶

## SOURCE CODE:

### FORM NEXT OF KIN

```
Private Sub cmdAddNew_Click()
    fees.Recordset.MoveLast
    If Not fees.Recordset.BOF Then
        fees.Recordset.AddNew
    Exit Sub
Else
    fees.Recordset.MoveNext
End If
End Sub

Private Sub cmdclose_Click()
    On Error Resume Next
    If MsgBox(" Are you sure you want to close?", vbYesNo) = vbNo Then Exit Sub
    Unload Me
End Sub

Private Sub cmddelete_Click()
    Dim intdelete As Integer
    intdelete = MsgBox("Are you sure you want to delete this record?", vbYesNo, "confirm")
    If intdelete = vbYes Then
        fees.Recordset.Delete
        MsgBox ("Record delete successfully")
    Else
        MsgBox ("Record not deleted")
    End If
End Sub

Private Sub cmdnext_Click()
    If Not fees.Recordset.EOF Then
        fees.Recordset.MoveNext
    End If
End Sub
```

```
Else
MsgBox ("There is no Next record")
End If
End Sub
```

```
Private Sub cmdprevious_Click()
If Not fees.Recordset.EOF Then
fees.Recordset.MovePrevious
Else
MsgBox ("There is no previous record")
End If
End Sub
```

```
Private Sub cmdsearch_Click()
Dim strsearch As String
strsearch = InputBox("Enter Registration number")
DataEnvironment1.rspayment.MoveFirst
While Not DataEnvironment1.rsnextOfKin.EOF
If UCase(strsearch) = UCase(DataEnvironment1.rsnextOfKin.Fields(0)) Then
MsgBox ("Search Successfull")
Exit Sub
Else
DataEnvironment1.rsnextOfKin.MoveNext
End If
Wend
MsgBox ("Record does not exist")

End Sub
```

```
Private Sub Form_Load()
```

```
Me.Height = 7920
```

```
Me.Width = 7980
```

```
End Sub
```

```
Private Sub txtAddress_LostFocus()
```

```
If IsNumeric(txtID.Text) Then
```

```
MsgBox ("Data entered should be character")
```

```
txt.SetFocus
```

```
txt.Text = ""
```

```
End If
```

```
End Sub
```

```
Private Sub txtFName_LostFocus()
```

```
If IsNumeric(txtID.Text) Then
```

```
MsgBox ("Data entered should be character")
```

```
txt.SetFocus
```

```
txt.Text = ""
```

```
End If
```

```
End Sub
```

```
Private Sub txtID_LostFocus()
```

```
If IsNumeric(txtID.Text) Then
```

```
MsgBox ("Data entered should be character")
```

```
txt.SetFocus
```

```
txt.Text = ""
```

```
End If
```

```
End Sub
```

```
Private Sub txtLName_LostFocus()
```

```
If IsNumeric(txtID.Text) Then
```

```
MsgBox ("Data entered should be character")
```

```
txt.SetFocus
```

```
txt.Text = ""  
End If  
End Sub
```

```
Private Sub txtNationality_LostFocus()  
If IsNumeric(txtID.Text) Then  
MsgBox ("Data entered should be character")  
txt.SetFocus  
txt.Text = ""  
End If  
End Sub
```

```
Private Sub txtSRegNo_LostFocus()  
If IsNumeric(txtID.Text) Then  
MsgBox ("Data entered should be character")  
txt.SetFocus  
txt.Text = ""  
End If  
End Sub
```

## **MAIN FORM**

```
Private Sub edit_Click(Index As Integer)
```

```
End Sub
```

```
Private Sub allStudents_Click(Index As Integer)
```

```
frmallstudents.Show
```

```
End Sub
```

```
Private Sub classList_Click(Index As Integer)
```

```
frmclassList.Show
```

```
End Sub
```

```
Private Sub MDIForm_Load()
```

```
Load Me
```

```
End Sub
```

```
Private Sub mnu_classList_Click(Index As Integer)
```

```
frmclassList.Show
```

```
End Sub
```

```
Private Sub mnu_copy_Click(Index As Integer)
```

```
'make sure that the clipboard is empty
```

```
Clipboard.Clear
```

```
'copy selected text to the clipboard
```

```
Clipboard.SetText Screen.ActiveControl.SelText
```

```
'selected text is not deleted - stays in control
```

```
End Sub
```

```
Private Sub mnu_cut_Click(Index As Integer)
```

```
'make sure that the clipboard is empty
```

```
Clipboard.Clear
```

```
'copy selected text to clipboard
```

```
Clipboard.SetText Screen.ActiveControl.SelText
```

```
'selected text is not deleted - stays in control
```

```
End Sub
```

```
Private Sub mnu_delete_Click(Index As Integer)
```

```
'delete selected text
```

```
Screen.ActiveControl.SelText = ""
```

```
End Sub
```



```
Private Sub mnu_exit_Click(Index As Integer)
Unload Me
End Sub
```

```
Private Sub mnu_nextOfKin_Click(Index As Integer)
frmnextofkin.Show
End Sub
```

```
Private Sub mnu_paste_Click(Index As Integer)
'place text from clipboard into active control
Screen.ActiveControl.SelText = Clipboard.GetText
End Sub
```

```
Private Sub mnu_payment_Click(Index As Integer)
frmpayment.Show
End Sub
```

```
Private Sub mnu_student_Click(Index As Integer)
frmstudents.Show
End Sub
```

```
Private Sub mnurptclasslist_Click()
rptclassList.Show
End Sub
```

## **FORM STUDENDTS**

```
Private Sub cmdAddNew_Click()
DataEnvironment1.rsstudents.AddNew
End Sub
```

```
Private Sub cmdclose_Click()
On Error Resume Next
```

```
If MsgBox(" Are you sure you want to close?", vbYesNo) = vbNo Then Exit Sub
Unload Me
End Sub
```

```
Private Sub cmddelete_Click()
Dim intdelete As Integer
intdelete = MsgBox("Are you sure you want to delete this record?", vbYesNo, "confirm")
If intdelete = vbYes Then
fees.Recordset.Delete
MsgBox ("Record delete successfully")
Else
MsgBox ("Record not deleted")
End If
End Sub
```

```
Private Sub cmdnext_Click()
If Not fees.Recordset.EOF Then
fees.Recordset.MoveNext
Else
MsgBox ("There is no Next record")
End If
End Sub
```

```
Private Sub cmdprevious_Click()
If Not fees.Recordset.BOF Then
fees.Recordset.MovePrevious
Else
MsgBox ("There is no previous record")
End If
End Sub
```

```
Private Sub cmdsave_Click()
```

```
On Error Resume Next
DataEnvironment1.rsstudents.Save
DataEnvironment1.rsstudents.MoveFirst
RESPONSE = MsgBox("The above information has been saved in the database.",
vbOKOnly)
End Sub
```

```
Private Sub cmdsearch_Click()
Dim strsearch As String
strsearch = InputBox("Enter Registration number")
DataEnvironment1.rsstudents.MoveFirst
While Not DataEnvironment1.rsstudents.EOF
If UCase(strsearch) = UCase(DataEnvironment1.rsstudents.Fields(0)) Then
MsgBox ("Search Successful")
Exit Sub
Else
DataEnvironment1.rsstudents.MoveNext
End If
Wend
MsgBox ("Record does not exist")

End Sub
```

```
Private Sub Form_Load()
Me.Height = 9150
Me.Width = 9150
End Sub
```

## FORM PAYMENT

```
Private Sub Label3_Click()
```

```
End Sub
```

```
Private Sub cmdAddNew_Click()
```

```
DataEnvironment1.rspayment.AddNew
```

```
End Sub
```

```
Private Sub btnbalance_Click()
```

```
Dim firstDeposit As Integer
```

```
Dim secondDeposit As Integer
```

```
Dim balance As Variant
```

```
firstDeposit = Val(txtFirstDeposit.Text)
```

```
secondDeposit = Val(txtSecondDeposit.Text)
```

```
balance = firstDeposit - secondDeposit
```

```
cmdbalance.txtBalance = balance
```

```
End Sub
```

```
Private Sub cmdclose_Click()
```

```
On Error Resume Next
```

```
If MsgBox(" Are you sure you want to close?", vbYesNo) = vbNo Then Exit Sub
```

```
Unload Me
```

```
End Sub
```

```
Private Sub cmddelete_Click()
```

```
Dim intdelete As Integer
```

```
intdelete = MsgBox("Are you sure you want to delete this record?", vbYesNo, "confirm")
```

```
If intdelete = vbYes Then
```

```
fees.Recordset.Delete
```

```
MsgBox ("Record delete successfully")
```

```
Else
```

```
MsgBox ("Record not deleted")
End If
End Sub
```

```
Private Sub cmdnext_Click()
If Not fees.Recordset.EOF Then
fees.Recordset.MoveNext
Else
MsgBox ("There is no Next record")
End If
End Sub
```

```
Private Sub bttnprevious_Click()
If Not DataEnvironment1.rspayment.EOF Then
DataEnvironment1.rspayment.MovePrevious
Else
MsgBox ("There is no previous record")
End If
End Sub
```

```
Private Sub cmdprevious_Click()
If Not fees.Recordset.BOF Then
fees.Recordset.MovePrevious
Else
MsgBox ("There is no previous record")
End If
End Sub
```

```
Private Sub cmdsave_Click()
On Error Resume Next
DataEnvironment1.rspayment.Save
DataEnvironment1.rspayment.MoveFirst
```

```
RESPONSE = MsgBox("The above information has been saved in the database.",  
vbOKOnly)  
End Sub
```

```
Private Sub cmdsearch_Click()  
Dim strsearch As String  
strsearch = InputBox("Enter Registration number")  
DataEnvironment1.rspayment.MoveFirst  
While Not DataEnvironment1.rspayment.EOF  
If UCase(strsearch) = UCase(DataEnvironment1.rspayment.Fields(0)) Then  
MsgBox ("Search Successful")  
Exit Sub  
Else  
fees.Recordset.MoveNext  
End If  
Wend  
MsgBox ("Record does not exist")  
  
End Sub
```

```
Private Sub Form_Load()  
Me.Height = 11520  
Me.Width = 15360  
End Sub
```

### **FORM CLASS LIST**

```
Private Sub cmdAddNew_Click()  
fees.Recordset.MoveLast  
If Not fees.Recordset.BOF Then  
fees.Recordset.AddNew  
Exit Sub  
Else
```

```
fees.Recordset.MoveNext
```

```
End If
```

```
End Sub
```

```
Private Sub cmdclose_Click()
```

```
On Error Resume Next
```

```
If MsgBox(" Are you sure you want to close?", vbYesNo) = vbNo Then Exit Sub
```

```
Unload Me
```

```
End Sub
```

```
Private Sub cmddelete_Click()
```

```
Dim intdelete As Integer
```

```
intdelete = MsgBox("Are you sure you want to delete this record?", vbYesNo, "confirm")
```

```
If intdelete = vbYes Then
```

```
fees.Recordset.Delete
```

```
MsgBox ("Record delete successfully")
```

```
Else
```

```
MsgBox ("Record not deleted")
```

```
End If
```

```
End Sub
```

```
Private Sub cmdnext_Click()
```

```
If Not fees.Recordset.EOF Then
```

```
fees.Recordset.MoveNext
```

```
Else
```

```
MsgBox ("There is no Next record")
```

```
End If
```

```
End Sub
```

```
Private Sub cmdprevious_Click()
```

```
If Not fees.Recordset.BOF Then
```

```
fees.Recordset.MovePrevious
```

```
Else
MsgBox ("There is no previous record")
End If
End Sub
```

```
Private Sub cmdsave_Click()
On Error Resume Next
fees.Recordset.Save
fees.Recordset.MoveFirst
RESPONSE = MsgBox("The above information has been saved in the database.",
vbOKOnly)
End Sub
```

```
Private Sub cmdsearch_Click()
Dim strsearch As String
strsearch = InputBox("Enter Registration number")
DataEnvironment1.rspayment.MoveFirst
While Not DataEnvironment1.rspayment.EOF
If UCase(strsearch) = UCase(DataEnvironment1.rspayment.Fields(0)) Then
MsgBox ("Search Successfull")
Exit Sub
Else
fees.Recordset.MoveNext
End If
Wend
MsgBox ("Record does not exit")
End Sub
```

```
Private Sub Form_Load()
Me.Height = 7575
Me.Width = 7680
End Sub
```



## FORM LOGIN

ption Explicit

Public LoginSucceeded As Boolean

Private Sub cmdCancel\_Click()

'set the global var to false

'to denote a failed login

LoginSucceeded = False

Me.Hide

End Sub

Private Sub cmdOK\_Click()

'check for correct password

If txtUserName = "gatrude" And txtPassword = "gatrude" Then

'place code to here to pass the

'success to the calling sub

'setting a global var is the easiest

LoginSucceeded = True

MDIfeesSystem.Show

Me.Hide

Else

MsgBox "Invalid Password, try again!", , "Login"

txtPassword.SetFocus

SendKeys "{Home}+{End}"

End If

End Sub

Private Sub txtUserName\_Change()

End Sub

```
Private Sub cmddelete_Click()
On Error Resume Next
confirm = MsgBox("Are sure you want to delete this record?", vbYesNo +
vbExclamation, "Deletion confirmation")
If confirm = vbYes Then
Adodc1.Recordset.Delete
MsgBox "Record deleted!", , "Message"
Else
MsgBox "Record not deleted!", , "message"
End If
End Sub
```

```
Private Sub cmdexit_Click()
Unload Me
End Sub
```

```
Private Sub cmdfirst_Click()
On Error Resume Next
Adodc1.Recordset.MoveFirst
End Sub
```

```
Private Sub cmdlast_Click()
On Error Resume Next
Adodc1.Recordset.MoveLast
End Sub
```

```
Private Sub cmdnext_Click()
On Error Resume Next
Adodc1.Recordset.MoveNext
End Sub
```

```
Private Sub cmdprevious_Click()
On Error Resume Next
Adodc1.Recordset.MovePrevious
End Sub
```

```
Private Sub cmdsave_Click()
On Error Resume Next
Adodc1.Recordset.Save
End Sub
```

```
Private Sub cmdsearch_Click()
On Error Resume Next
Dim strsearch As String
strsearch = InputBox("Enter the Class you are in.")
```

```

Private Sub cmdsearch_Click()
On Error Resume Next
Dim strsearch As String
strsearch = InputBox("Enter the Class you are in.")
Adodc1.Recordset.MoveFirst
While Not Adodc1.Recordset.EOF
If UCase(strsearch) = UCase(Adodc1.Recordset.Fields(0)) Then
MsgBox ("search successful")
Exit Sub
Else
Adodc1.Recordset.MoveNext
End If
Wend
MsgBox ("Record not found")
End Sub

```

```

Private Sub Form_Load()

```

```

End Sub
Option Explicit

```

```

' Reg Key Security Options...

```

```

Const READ_CONTROL = &H20000
Const KEY_QUERY_VALUE = &H1
Const KEY_SET_VALUE = &H2
Const KEY_CREATE_SUB_KEY = &H4
Const KEY_ENUMERATE_SUB_KEYS = &H8
Const KEY_NOTIFY = &H10
Const KEY_CREATE_LINK = &H20
Const KEY_ALL_ACCESS = KEY_QUERY_VALUE + KEY_SET_VALUE +
KEY_CREATE_SUB_KEY + KEY_ENUMERATE_SUB_KEYS +
KEY_NOTIFY + KEY_CREATE_LINK + READ_CONTROL

```

```

' Reg Key ROOT Types...

```

```

Const HKEY_LOCAL_MACHINE = &H80000002
Const ERROR_SUCCESS = 0
Const REG_SZ = 1 ' Unicode nul terminated string
Const REG_DWORD = 4 ' 32-bit number

```

```

Const gREGKEYSYSINFOLOC = "SOFTWARE\Microsoft\Shared Tools Location"
Const gREGVALSYSINFOLOC = "MSINFO"
Const gREGKEYSYSINFO = "SOFTWARE\Microsoft\Shared Tools\MSINFO"
Const gREGVALSYSINFO = "PATH"

```

```
Private Declare Function RegOpenKeyEx Lib "advapi32" Alias "RegOpenKeyExA"  
(ByVal hKey As Long, ByVal lpSubKey As String, ByVal ulOptions As Long, ByVal  
samDesired As Long, ByRef phkResult As Long) As Long  
Private Declare Function RegQueryValueEx Lib "advapi32" Alias "RegQueryValueExA"  
(ByVal hKey As Long, ByVal lpValueName As String, ByVal lpReserved As Long,  
ByRef lpType As Long, ByVal lpData As String, ByRef lpcbData As Long) As Long  
Private Declare Function RegCloseKey Lib "advapi32" (ByVal hKey As Long) As Long
```

```
Private Sub cmdSysInfo_Click()  
    Call StartSysInfo  
End Sub
```

```
Private Sub cmdOK_Click()  
    Unload Me  
End Sub
```

```
Private Sub Form_Load()  
    Me.Caption = "About " & App.Title  
    lblVersion.Caption = "Version " & App.Major & "." & App.Minor & "." &  
App.Revision  
    lblTitle.Caption = App.Title  
End Sub
```

```
Public Sub StartSysInfo()  
    On Error GoTo SysInfoErr
```

```
    Dim rc As Long  
    Dim SysInfoPath As String
```

```
    ' Try To Get System Info Program Path\Name From Registry...  
    If GetKeyValue(HKEY_LOCAL_MACHINE, gREGKEYSYSINFO,  
gREGVALSYSINFO, SysInfoPath) Then  
        ' Try To Get System Info Program Path Only From Registry...  
        ElseIf GetKeyValue(HKEY_LOCAL_MACHINE, gREGKEYSYSINFOLOC,  
gREGVALSYSINFOLOC, SysInfoPath) Then  
            ' Validate Existance Of Known 32 Bit File Version  
            If (Dir(SysInfoPath & "\MSINFO32.EXE") <> "") Then  
                SysInfoPath = SysInfoPath & "\MSINFO32.EXE"  
  
            ' Error - File Can Not Be Found...  
            Else  
                GoTo SysInfoErr  
            End If  
        ' Error - Registry Entry Can Not Be Found...  
        Else
```

```

    GoTo SysInfoErr
End If

Call Shell(SysInfoPath, vbNormalFocus)

Exit Sub
SysInfoErr:
    MsgBox "System Information Is Unavailable At This Time", vbOKOnly
End Sub

Public Function GetKeyValue(KeyRoot As Long, KeyName As String, SubKeyRef As
String, ByRef KeyVal As String) As Boolean
    Dim i As Long                ' Loop Counter
    Dim rc As Long              ' Return Code
    Dim hKey As Long            ' Handle To An Open Registry Key
    Dim hDepth As Long          '
    Dim KeyValType As Long      ' Data Type Of A Registry Key
    Dim tmpVal As String        ' Temporary Storage For A Registry Key
Value
    Dim KeyValSize As Long      ' Size Of Registry Key Variable
    '-----
    ' Open RegKey Under KeyRoot {HKEY_LOCAL_MACHINE...}
    '-----
    rc = RegOpenKeyEx(KeyRoot, KeyName, 0, KEY_ALL_ACCESS, hKey) ' Open
Registry Key

    If (rc <> ERROR_SUCCESS) Then GoTo GetKeyError    ' Handle Error...

    tmpVal = String$(1024, 0)                ' Allocate Variable Space
    KeyValSize = 1024                        ' Mark Variable Size

    '-----
    ' Retrieve Registry Key Value...
    '-----
    rc = RegQueryValueEx(hKey, SubKeyRef, 0, _
        KeyValType, tmpVal, KeyValSize) ' Get/Create Key Value

    If (rc <> ERROR_SUCCESS) Then GoTo GetKeyError    ' Handle Errors

    If (Asc(Mid(tmpVal, KeyValSize, 1)) = 0) Then    ' Win95 Adds Null Terminated
String...
        tmpVal = Left(tmpVal, KeyValSize - 1)      ' Null Found, Extract From String
    Else                                            ' WinNT Does NOT Null Terminate String...
        tmpVal = Left(tmpVal, KeyValSize)          ' Null Not Found, Extract String
Only
    End If

```

```

'-----
' Determine Key Value Type For Conversion...
'-----
Select Case KeyValType          ' Search Data Types...
Case REG_SZ                    ' String Registry Key Data Type
    KeyVal = tmpVal            ' Copy String Value
Case REG_DWORD                 ' Double Word Registry Key Data Type
    For i = Len(tmpVal) To 1 Step -1    ' Convert Each Bit
        KeyVal = KeyVal + Hex(Asc(Mid(tmpVal, i, 1))) ' Build Value Char. By Char.
    Next
    KeyVal = Format$("&h" + KeyVal)      ' Convert Double Word To String
End Select

GetKeyValue = True              ' Return Success
rc = RegCloseKey(hKey)         ' Close Registry Key
Exit Function                   ' Exit

GetKeyError:    ' Cleanup After An Error Has Occured...
    KeyVal = ""    ' Set Return Val To Empty String
    GetKeyValue = False    ' Return Failure
    rc = RegCloseKey(hKey)    ' Close Registry Key
End Function
Private Sub MDIForm_Load()

End Sub

Private Sub mnuaboutus_Click()
frmAbout.Show vbModal, Me
End Sub

```