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COMPUTERIZED INFORMATION SUPPORT SYSTEM FOR THE IMMIGRATION AND CONSULAR DEPARTMENT OF ETHIOPIA

A Thesis submitted in partial fulfilment of the requirements for the degree of Master of Science in Information Science.

by

HADERA ABERA ADMASSU

June 1995

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Computerized Informaiton Support System for

The Immigration and Consular Department on Ethiopia

by

Hadera Abera Admassu

School of Information Studies for Africa (SISA)

Approved by Board of Examiners

	Signature
Ato Getachew Birru, Chairman, Examining Board	
Ato Dawit Berhanu, Advisor	
Dr. G.G. Chowdhury, Advisor	
Dr. Rick Gibson, External Examiner	
Ato Tesfaye Biru, Internal Examiner	

DECLARATION

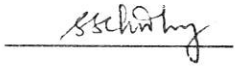
The Thesis is my original work and has not been presented for a degree in any other university.



Hadera Abera Admassu

May 24, 1995

The Thesis has been submitted for examination with our approval as university advisors.



Dr. G.G. Chowdhury

May 24, 1995



Ato Dawit Birhanu

May 24, 1995

DEDICATION

This Thesis is dedicated to my mother to whom

I owe everything I claim to have achieved.

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This thesis could not have been written without the help encouragement, and support of many people.

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ABSTRACT

Data and information that may be extracted from them are a key resource for all organizations - commercially oriented or not-for-profit - for enhanced performance and greater efficiency in operations (Eardley 1991). The Immigration and Consular Department, whose entire operation is based on capturing, processing, storing, maintaining and manipulating data related to travel transactions, is no exception.

On a day-to-day basis, every activity of an immigration and consular service is dependent on instant processing and manipulation of a large amount of travel data, not only to provide efficient and timely public service but also to ensure that any request for a Passport or Visa is adjudicated and processed on the basis of reliable information.

Although the number of persons moving into and out of the country has substantially increased over the past few years, the capability of the Department to collect, process, store and manipulate data related to this has not been improved. Its activities are still largely based the traditional manual and paper-based system which has severely limited its ability to provide efficient service and to deal with the increasing number of requests for a travel document.

The primary theme of the work reported in this thesis is therefore an attempt to an analyze and design computer-based Immigration and Consular Service that would lead to an efficient system to facilitate the collection, processing, handling and maintaining of travel data.

To this end, an effort has been made to learn how the current system operates and to identify the requirements that would form added features of the improved system. To gather facts on these and the overall situation in the Department, face-to-face discussion and interview, record inspection and on-site review and observations have been extensively used.

Based on the analysis of the facts collected and the requirements identified, different design alternatives are considered and evaluated, of which one design option is recommended and further defined, that would help operation of the Department to be more efficient and effective.

Entities about which the Department maintains information and the data elements upon which the proposed databases are to be built are identified and analyzed using different conceptual data models which provide a means for the representation and manipulation of these data in a way that is amenable to computerization.

Furthermore, two prototype databases are physically designed and an application program developed for one of the prime problem areas of the existing system, i.e., the issue of new Passport, to demonstrate how the proposed system would operate in a real-life situation.

Finally, a proposal for software and hardware acquisition and installation as well as recommendation for implementing the proposed computer-assisted system is presented.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND INFORMATION ABOUT THE WORKING ENVIRONMENT

1.1.1 General

Freedom of movement, apart from being one of the most fundamental natural rights of the human being, has an important role to play in the overall development of any nation. Economic, social, cultural, intellectual and spiritual wealth of the modern society, for large part, are the results of long history of interaction among the peoples of the world.

In an ideal world, everyone should have the freedom to move to and live and work in any part of the glob. Such a freedom would enhance the range of choices open to the individual and permit certain type of socio-economic transformation (Aldy 1994). In the modern world, however, political, economic, social and security concerns of governments necessitated the establishment of procedures governing the movement of persons to and from their country. Hence, although specific immigration and consular laws and regulations may vary from one country to another, a person entering to or departing from any country is more or less universally required to possess: -

1. Valid travel document (Passport or other document) bearing the photograph of the person to whom issued and containing a statement by the issuing authority as to the identity and nationality of the holder;
2. Valid Visa issued by the competent authority of the country the bearer wishes to

enter which (after appropriate inspection) enables him to enter and travel within the borders of a foreign country.

The emergence of the immigration and consular practice in Ethiopia is, therefore, in line with the above general fact and specifically, conditions for entry to and departures from Ethiopia are prescribed under the country's immigration law as:

(1) no foreigner will enter Ethiopia unless he is in possession of (a) a valid travel document; (b) a valid Visa; (c) a valid international health certificate demonstrating that he has received such immunization as the Ministry of Health may from time to time prescribe.

(2) no person will depart from Ethiopia unless he is in possession of

(a) a valid travel document; (b) a more valid exit Visa;(c) a valid Visa and international health certificate as required for entry by the country of destination.

1.1.2 Establishment

Formal and institutionalized immigration and consular practice in Ethiopia dates back to the 1940s. It was at this time that Proclamation No. 36 of 1943, specifically concerned with immigration, and Proclamation No. 57 of 1944, which deals with registration of foreigners resident in Ethiopia, were issued. However, it was Proclamation 271/69 issued in 1969 which laid the basis for the establishment of the Immigration and Consular Main Department as it appears and operates today. This proclamation empowered the Ministry of Interior (as the parent Ministry was called at that time) to:

- issue exit Visa to Ethiopian nationals as well as exit and re-entry Visa to foreign nationals;

- register and issue Residence Permit to foreign nationals, other than the diplomatic community, living in Ethiopia.

On the other hand, the same proclamation vested the responsibility of issuing all types of Passports (Diplomatic, Special and Ordinary Passports) in the Ministry of Foreign Affairs.

Twenty years later, i.e., in 1988, the Ministry of Internal Affairs (as it is currently being called) assumed additional responsibility by Proclamation 8/88, and started to issue Ordinary Passport to Ethiopian nationals who wish to go abroad for visiting or on a business. Diplomatic and Special Passports are still issued by the Ministry of Foreign Affairs.

Since Ordinary Passport is the main type of travel document issued to citizens, this additional function has significantly increased the activities of the Immigration and Consular Main Department (henceforth the Department) and brought about a substantial change on its organizational structure and complexity.

1.1.3 Functions

In accordance with the proclamations mentioned above, the Department currently performs the following specific functions:

- issues Ordinary Passport, Laissez-passer and emergency travel documents to Ethiopian nationals;
- issues and extends exit, entry and re-entry Visas to Ethiopian and foreign nationals;

- inspects the validity of travel documents and Visa of incoming and outgoing passengers at ports of disembarkation and embarkation respectively;
- registers and issues Residence Permit to all foreigners, other than the diplomatic community, resident in Ethiopia and renews their Residence Permit regularly (every year);
- grants, in consultation with the Ministry of Foreign Affairs and the Ministry of Justice, citizenship to foreigners who request Ethiopian nationality;
- keeps records on issued Passports, Visas, Residence Permits as well as list of nationals and foreigners whose departure from and entrance to the country, respectively, must be prevented for legal reasons.

1.1.4 Organizational Structure

To discharge the above activities, the Department is organized into three major functional units namely, the Reception, Passport and Visa Main Sections. It has also other subunits which provide support to these major sections in checking, processing, recording and issuing travel documents, Visa and Residence Permits. The current organizational structure of the Department is presented in Figure 1.1.

Currently, there are 197 employees working in the Department out of which 118 are directly involved in processing and handling travel transactions and Residence Permits. Outside Addis Ababa it has branch offices at Diredawa (eastern Ethiopia) and Moyallie (located at the Ethio-Kenya border). It has also a plan to open consular and Visa offices at main ports of entry along the Ethio-Sudan, Ethio-Djibouti and Ethio-Eritrea borders.

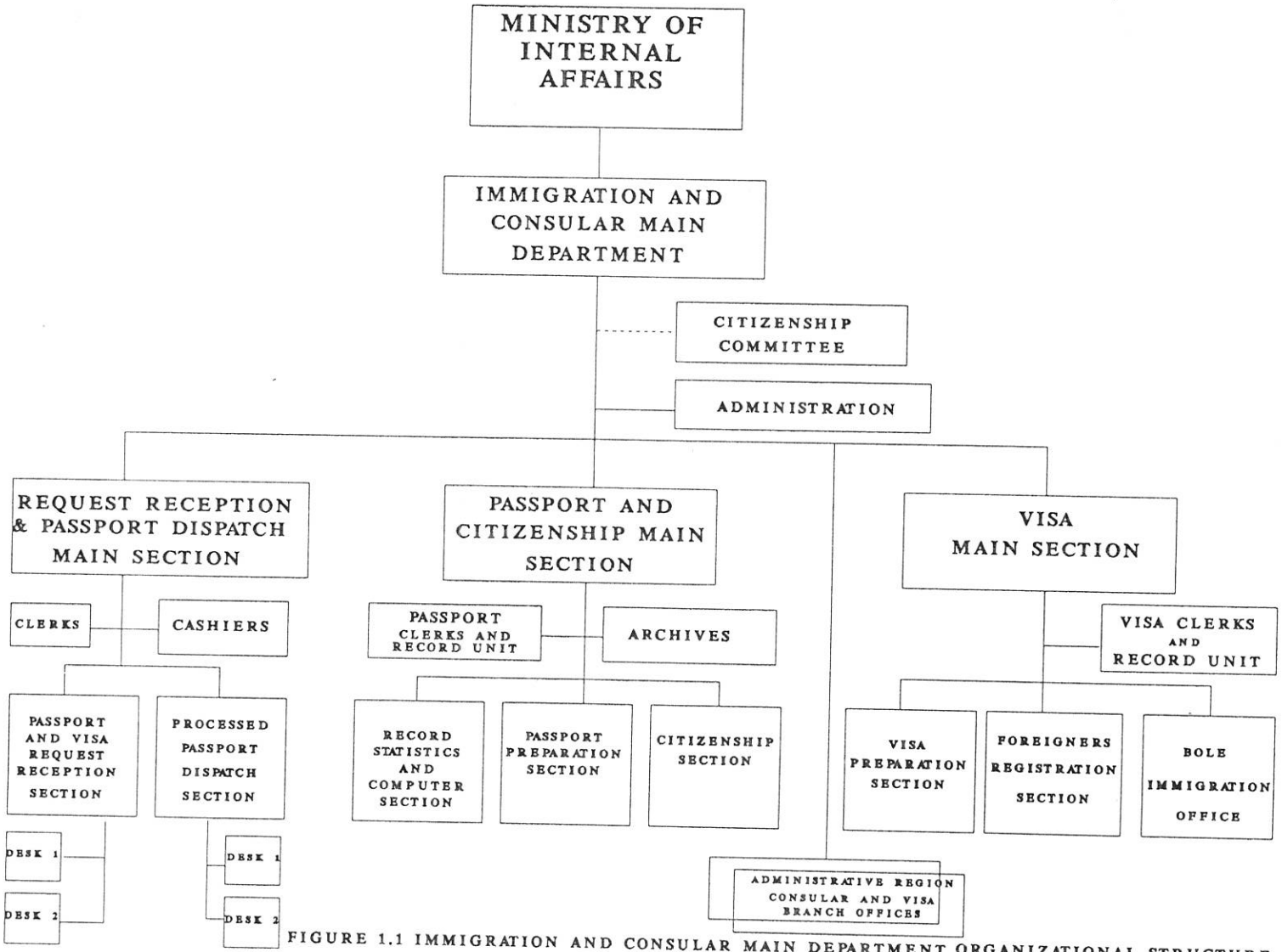


FIGURE 1.1 IMMIGRATION AND CONSULAR MAIN DEPARTMENT ORGANIZATIONAL STRUCTURE

1.2 JUSTIFICATION FOR THE STUDY.

1.2.1 Volume of Activities

Since the Transitional Government of Ethiopia took power in May 1991, all kinds of travel restriction that were imposed upon nationals by the defunct military regime have been lifted. Today, every citizen is free to move out of and into the country.

As a result, the number of nationals who request Passport and Visa has substantially increased over the past four years. The market oriented economic policy and the peace and stability that the country experienced during those years has also attracted foreign investors and tourists into the country.

These and other similar developments being witnessed in the country have, therefore, forced the Department to receive and process a very large number of travel requests and to manipulate huge volume of data related to issued Passports, Visas and Residence Permits.

To give an overview of the magnitude of the tasks and the volume of records handled by the Department, the following data is provided.

TABLE 1.1

NUMBER OF PASSPORTS ISSUED AND RENEWED FROM 1991/92-1993/94

Type of Travel Document Processed	91/92 (1984 EC)	92/93 (1985 EC)	93/94 (1986 EC)
1. Newly issued Regular Passport	44,200	89,094	76,906
2. Temporary Travel Documents (Laissez-Passer and 'Umra' Pass paper)	11,355	24,984	8,730
3. Renewed and Corrected Passport	N.A	14,949	16,895

Source: Immigration and Consular Main Department Annual Reports 1991/92, 1992/93 and 1993/94.

TABLE 1.2

NUMBER OF EXIT/RE-ENTRY VISA ISSUED TO ETHIOPIAN NATIONALS AND RESIDENT FOREIGNERS FROM 1991/92-1993/94

Type of Visa	91/92 (1984 EC)	92/93 (1985 EC)	93/94 (1986 EC)
1. Exit visa issued to Ethiopian nationals	70,379	103,499	79,673
2. Re-entry, Exit and Multiple trip Visa issued to foreigners resident in Ethiopia	6,894	6,924	6,966
3. Exit Visa issued to Ethiopian nationals residing abroad	N.A	9,713	10,595

Source : Immigration and Consular Main Department Annual Reports 1991/92, 1992/93 and 1993/94.

TABLE 1.3

NUMBER OF RESIDENCE PERMIT ISSUED AND RENEWED TO RESIDENT FOREIGNERS FROM 1991/92-1993/94

Residence Permit	91/92 (1984 EC)	92/93 (1985 EC)	93/94 (1986 EC)
1. Issue of new Residence Permit	1,324	1,053	952
2. Renewal of Residence Permit*	9,385	4,622	2,163

* It is estimated that there are 7,000 foreigners other than the diplomatic community, currently living in Ethiopia.

Source : Immigration and Consular Main Department Annual Reports 1991/92, 1992/93 and 1993/94.

TABLE 1.4

NUMBER OF PERSONS TRANSITED TO AND FROM ETHIOPIA THROUGH BOLE AIR PORT FROM 1991/92-1993/94

Flow of Passengers Through Bole Airport	91/92 (1984 EC)	92/93 (1985 EC)	93/94 (1986 EC)
1. Incoming Passengers	98,404	127,883	124,451
2. Outgoing Passengers	106,633	156,759	133,896

Source : Immigration and Consular Main Department Annual Reports 1991/92, 1992/93 and 1993/94.

TABLE 1.5

NUMBER OF TOURISTS ENTERED TO ETHIOPIA THROUGH BOLE AIR PORT FROM 1991/92-1993/94

Flow of Tourists Through Bole Airport	91/92 (1984 EC)	92/93 (1985 EC)	93/94 (1986 EC)
1. Entered	707	17,733	23,256
2. Returned on time	236	8,094	10,305

Source : Immigration and Consular Main Department Annual Reports 1991/92, 1992/93 and 1993/94.

TABLE 1.6

FEES COLLECTED FROM PASSPORT, VISA AND RESIDENCE

PERMIT FROM 1991/92-1993/94

Fees Collected from Passport Visa and Residence Permit Services (in Birr)	91/92 (1984 EC)	92/93 (1985 EC)	93/94 (1986 EC)
1. Passport	5,906,634	10,051,309	9,013,728
2. Visa	2,724,158	5,271,116	2,909,773
3. Exit Visa Issued at Bole	332,265	469,960	528,259
4. Residence Permit	546,290	547,245	681,385
5. Fine (fine illegal Tourists)	N.A	70,790	84,750
6. Visa and Residence fees collected by Diredawa branch office	22,707	259,102	312,538
Grand Total	9,532,054	16,669,522	13,530,433

Source : Immigration and Consular Main Department Annual Reports 1991/92, 1992/93 and 1993/94.

These large volumes of various types of documents, Visas and Residence Permits issued by the Department are exclusively inspected, processed and stored manually through the use of human labour and paper alone. Records of issued Passports, Visas and Residence Permits as well as Watch List files (a file containing information about persons who, for legal reasons, are not allowed to enter or depart from the country) are organized and stored in paper files and cards. The situation, therefore, created unprecedented strain on the already saturated capacity of the Department which called for the initiation of this study.

1.2.2 Computer-assisted Immigration and Consular Service.

Computer is an important technological advance of the modern society because it extends and expands human capabilities. While many activities and resources have long been devoted to the acquisition, processing and handling of data, it is only the advent of electronic computers which has greatly extended data handling and processing capabilities of organizations.

Computers are extremely fast and almost perfect in reliability and accuracy. They are unrivalled in their capacity to store data and suited to any task that involves large amounts of retrieval, computations, manipulations and comparisons. The amount of data that can be stored on devices such as magnetic disk is constantly increasing while the cost per character of data stored is decreasing. Records stored in computer systems are much easier to update, add or delete. Furthermore, data once captured and entered to the computer system can be transmitted when and wherever needed through a communication network to different categories of users which may be physically located within or outside the organization.

Nowadays, computer-based information systems have influenced organizations of all types, including the not-for-profit, such as government departments, hospitals and schools. "Falling hardware costs and the development of an extensive and reliable range of microcomputers have made computerization realistic for all information environments" (Rowley 1990, vii).

Such computer-assisted information systems are particularly useful in government

organizations like the Immigration and Consular Department, where instant processing and manipulation of a large amount of data is absolutely necessary to provide efficient and timely public service.

The large number of requests for travel documents, Visas and Residence Permit have to be processed and issued on time. Records of persons to whom Passports, Visas and Residence Permits have been issued should be stored, maintained, retrieved and updated. This can be done efficiently through the use of computers and they have been successfully applied to immigration and consular services in many parts of the world.

1.3 OBJECTIVE OF THE STUDY

1.3.1 General Objective

The overall objective of this study is to investigate the existing immigration and consular system in Ethiopia, to identify all its problems, to define the requirements and then to design and propose computer-based information support system for the issuance of Passport, Visa and the registration of resident and non-resident foreigners. Its fundamental aim is to help improve the management of records pertaining to Passport, Visa, Residence Permit and non-resident foreigners so that the Department will be able to provide better and efficient service.

1.3.2 Specific Objective.

The specific objectives of the study are: -

- to identify the actual and potential users of information relating to Passport, Visa and Residence Permit within the Department;
- to assess and analyze the information requirements of these users;
- to examine the information system currently in use for the issuance and renewal of Passport, Visa and Residence Permit and, then, to investigate its major shortcomings;
- to analyze information required to prepare and issue Passport and exit Visa to Ethiopian nationals in different occupational categories;
- to identify the different types of data elements required to prepare, issue and renew Residence Permits to foreign nationals resident in Ethiopia as well as information required to prepare and issue different types of exit Visas to both resident and non-resident foreigners;
- to design databases consisting data on issued Passports and Visas, persons Watch List and resident and non-resident foreigners;
- to define the requirements and propose communication network to facilitate the transfer of data among the different sections of the Department and with the Immigration branch office at Bole airport;
- to define the input, processing, output, control and security requirements of the proposed computer-assisted Immigration and Consular system;
- to design a prototype computer-assisted system for checking and processing of a request for new Passport, define its major functions and demonstrate how the

prototype system operates; and finally

- to suggest and recommend ways and means of installing and setting up of the proposed computer-based Immigration and Consular system.

1.4 SIGNIFICANCE OF THE WORK

From the several discussions held with the management of the Department, the analyst came to know that a committee was set up in the last months of 1994 to draft liberal and harmonized consular and customs laws to encourage and facilitate the movement of persons to and form the country. This committee was headed by the Foreign Minister and comprised members from the Ministry of foreign Affairs, Ministry of Justice, Immigration and Consular Main Department, the Tourism Commission, Customs Office, National Bank and the Ethiopian airlines.

The committee drafted an extensive document which took more than six months and involved over fifty governmental and non-governmental organizations. In this draft document it is strongly recommended that the Immigration and Consular Main Department should computerize its services as soon as possible. The draft document is already submitted to the Office of the Prime Minister and is expected to be approved shortly.

In light of this fact the work that has been reported in this study is believed to serve as a basis for the automation program being considered by the Department. Noting its significance, the management and the staff of the Department as well as higher officials at the Ministry of Internal Affairs were also very enthusiastic and eager for the commencement

of this study and have extended their unfailing encouragement and support throughout the conduct of the project.

1.5 METHODOLOGY

1.5.1 Systems Analysis and Design

Systems analysis and design, in broader context, is a problem solving methodology concerned with the process of examining an organizational situation with the intent of improving it through better procedures and methods (Bingham and Davies 1978, Senn 1984).

There are many variants in systems analysis and design methodologies and different ways of classifying them. Due to the rapid changes in technology and the recognition of the need to consider the human aspect of organizations, the methods have shown dramatic changes and improvement in recent years (Eason 1988).

The methodologies range from the Traditional Data Processing Design, where systems design is dominated by computer specialists, to the Partcipative Design methods, which emphasize on user-dominated design. The advent of cheap and small microcomputers has also created a situation where users can do the design themselves to meet their specific requirements without the assistance of a specialist.

From the variety of systems analysis and design methodologies available today the modern ones that are gaining increasing popularity are the structured design methods. Structured methods provide a formal and organized way of working through the stages of design to ensure consistency, documentation, change of control and above all recognize that the potential users of a system should have the ultimate voice in the design process. Use of structured design methods obliges the designer to provide to the user with the evidence of the design process and the user is empowered to assess the progress. Unlike the Traditional Data Processing Design approach which follows linear sequence, each stage in the structured methods is reviewed by the user and the next stage doesn't commence until the output of the preceding stage is approved and accepted by the user. Generally, all structured methodologies have common features in that "they use graphical models to document the outcome of each step, place heavy emphasis on user participation in the design process and involve repetition of the previous phase(s) and step(s)" (Daniels and Yeates 1982).

On the basis of emphasis of each methodology, Rowley (1990), and Eardley et al (1991) have categorized the best known structured design tools into three major groups as described below:

Functional Decomposition Methodologies

These structured design methodologies emphasize on the breaking down of systems into smaller subsystems, so that the whole system can easily be understood. Some of the best known functional methodologies include the top-down approach, bottom-up approach, HIPO and step-wise refinement approach.

Data-and-Process Design Methodologies

These methodologies are broadly divided into two groups, namely data-oriented and process oriented. The data-oriented methodologies mainly emphasize on the characteristics of the data being processed by the system. Data flow-oriented (process) methodologies, on the other hand, are based on the decomposition of a system into modules by considering the types of data elements and their logical behaviour within the system. **Data-oriented Methodologies** include Structure Analysis and Design Technique(SADT), Composite Design, Structured design, Structured System Analysis(SAS), Structured Systems Analysis and Design Methodologies (SSADM), etc.

Process-oriented methodologies include Jackson systems Development (JSD), Structured Analysis, Design and Implementation of Computer Systems (STRADIS), Warnier/Orr methodology, Information Engineering Methodology(IEM), etc.

Prescriptive methodologies

These are basically computerized design procedures commonly used by analysts to develop software. The most widely used prescriptive design methodologies include Chapin's approach, design by objective (DBO), Problem Analysis Diagram (PAD), Problem Statement Language(PSL)/Problem Statement Analysis (PSA).

It is not always easy to select the 'best' one from the structured methodologies described above for this depend on the quality of the resulting analysis and the complexity of the system under investigation. As a result, the analysis and design methodology used for this study is a combination of useful elements of the functional decompostion and data-and process-oriented design methodologies mentioned above, with heavy emphasis being placed on SSADM. The reason being that SSADM builds up several views of the system (Data

Structure Diagram, Data Flow Diagrams and Entity Life Histories) which allow cross-checking of one another during the analysis and design process.

1.5.2 Data Collection

All information systems begin with data. Understanding the data is the first step towards building an information system. Equally important is knowing what the system is doing and what processes it invokes to achieve its ends. These facts are very essential for the design and development of successful systems.

Therefore, much of the analysis stage of this study was mainly concerned with collecting data on :-

- operation of the existing system and the methods used to handle data;
- actual and potential information users of the system;
- the output requirement of the system that would satisfy the information needs of those users;
- the input requirements of the system to produce desired outputs;
- the processing requirements of the system to produce the defined outputs;
- data elements stored by the system, etc;

To collect information on these and similar aspects of the system, the following data collection methods have been used extensively during the study :-

Background Reading

In order to thoroughly understand the objectives, goals, activities and functions of the Department, the analyst undertook a background reading on various documents. These include organizational charts, duties and responsibilities of different sections and units; different application forms used to process Passports, Visas and Residence Permits; cards and files on which data on issued Passports, Visas and Residence Permits are stored; sample Passports, Visas and Residence Permits; and quarterly and annual reports prepared by the Department.

Interviews

Face-to-face discussion with management and different categories of users in Department covering all aspects and problems of the existing system was the major data collection technique used for this study. In addition to investigating the existing system, the discussions also covered the requirements that must be satisfied by the proposed computer-assisted system that would solve the existing problems.

Observation

On site observation has also been carried out right from the place where requests for Passport, Visa and Residence Permit are presented by applicants up to the place where processed Passports and Residence Permits are handed over to the respective owners. This enabled the analyst to identify features of the existing system, flow of work, normal and peak work loads and methods of producing and storing information within and among the different functional units of the Department.

1.5.2. Sources of Data

The main source of data used for this study was the Immigration and Consular Main Department of the Ministry of Internal Affairs for which the new computer-assisted system is designed and proposed.

Other government organizations, mainly the Ministry of Labour and Social Affairs and the Civil Service Commission which are directly involved in issuing work permits to resident foreigners have also been consulted.

1.6 SCOPE AND LIMITATIONS OF THE STUDY

Development of computer system by its very nature is a team work and requires substantial pool of minds and resource depending on the nature and complexity of the system under consideration. Therefore, the study doesn't claim exhaustive and full treatment of the system covering all its aspects. It is a preliminary work primarily concerned with examining the existing problems and designing and proposing possible solutions for the existing problems.

Although the rapidly falling hardware prices have made computerization a viable and cost-effective option for all information environments, the study doesn't include a detailed feasibility analysis, mainly due to time constraint, to show concretely the advantages of computer-assisted system over the existing manual-based immigration service, both in terms of cost and efficiency.

Furthermore, although the flow of data and how the new system should work is broadly

established in the design stage, following this, requirements of the Department in terms of hardware together with a suitable support environment and of the appropriate software are not specifically determined.

1.7 ORGANIZATION OF THE STUDY

The study is divided into six chapters.

The First Chapter is this one, which consists of an introduction and covered such topics as background information about the working environment, i.e., the Immigration and Consular Main Department, justification of the study, objective of the study, significance of the work, methodologies employed, etc.

The Second Chapter describes the existing system. In this chapter data gathered about the current system are analyzed in detail to provide a clear picture of what the existing system does, how it does it, and what has been identified as problems and general requirements that must be fulfilled by the proposed system to solve these problems are described. The results of the analysis are presented using different levels of Data Flow Diagrams (dads).

Chapter Three presents general design of the proposed system. In this chapter an attempt is made to model the logical system by focusing on the logical events required by the system independently of the current structure of the Department. Based on logical view of the system, different design alternatives are presented each having its strengths and weaknesses

and, then, one design alternative capable of meeting requirements of the proposed computer-assisted system is recommended. The recommended system is further defined in terms of its output, input, processing, control and security requirements.

Chapter Four describes the design of the logical databases. Entities, relationships and data items of the system are analyzed and modelled in great detail to come up with optimized and well-structured data items. Additionally, a data dictionary, holding information about the data maintained by the Department, is compiled.

Chapter Five presents the discussion on physical or detail design and covers such topics as the design of prototype database using CDS/ISIS, development of a sample application program, design of forms and man-machine interface and considerations for hardware and software selection and proposal for network.

Chapter six, the last one, summarizes findings of the study and provides further recommendations for implementing the proposed computer-assisted immigration and consular system.

CHAPTER TWO

ANALYSIS OF THE SYSTEM OPERATIONS AND CURRENT PROBLEMS

2.0 INTRODUCTION

The primary task of a system analyst, involved in systems analysis and design activities, is collecting information on the current state of the system under investigation. The information that should be collected about an existing system generally includes what the current system does, why and how it does what it does, its users, its current problems and how the current activities can be done more efficiently.

Systems analysis is, therefore, a process of gathering and interpreting these facts about a system under consideration which aims at building a detailed representation of the current physical system.

Complete knowledge of the current system is crucial to understand users and their requirements in order to lay down a solid foundation upon which new and more efficient methods of accomplishing the primary tasks of the users can be built. In short, analysis of the current system provides a firm basis for the design of the future system and enables to determine how the computer can be used (if at all) to make its operation more effective.

This chapter, therefore, focuses on analysis of operations and current problems of the Immigration and Consular Main Department using the techniques associated with systems

analysis. It investigates what and how the current system works, identifies the major problems, and then establishes, in a broader context, the requirements for the proposed computer-assisted Immigration and Consular Service without detail consideration of how these are to be satisfied by the new system.

To describe the existing system accurately, an attempt has been made to analyze every aspect of the Department covering its main functions and activities, in order to see how far it meets its objectives and to identify what remains to be done by the new system.

The results of the investigation are documented using Data Flow Diagrams to highlight essential features of the existing system. These diagrams were presented to the users and discussed upon to ensure that the analyst clearly understood and included all the important elements of the system.

As mentioned in the Chapter one, the information used as an input for the analysis provided in this chapter have been obtained, by and large, from discussions held with management and staff of the Department.

For a system as large as the Immigration and Consular Department of Ethiopia, it was difficult to find a single user with detailed knowledge of every part of the system. Therefore, the analyst had to build up an overall picture of the current system from a set of partial views obtained from a range of users, and worked closely with and talked to many users at different levels to understand and document the current system accurately.

2.1 CURRENT SYSTEM DESCRIPTION

The functions of any man-made system, whether it is a manufacturing, finance or service rendering, can be segmented into two broad categories commonly referred to, in business and management literature, as line and staff functions. Line function consists of those activities which are directly involved in producing the products, providing the services, generating the revenues, and the profits of the organization (Modell 1988). These are the functions for which the organization is basically established and the very reasons for its existence.

The staff functions of an organization, on the other hand, are those activities which provide support service for the day-to-day well being of the system in accomplishing its main objectives, i.e., the line functions.

The main activities of the Immigration and Consular Main Department can therefore be broadly categorized into four major line functions. These are:

(1) Issuing Passport/Laissez-Passer to Ethiopian nationals;

(2) Issuing different types of Visas to both Ethiopian and foreign nationals;

(3) Registering and granting Residence Permit to foreigners requesting to reside in Ethiopia; and

(4) Inspecting outgoing and incoming passengers at ports of entry and exit.

In order to see how these are executed by the system, detail understanding of the functions, processes and the tasks involved and the relationship of those functions, processes and tasks

to each other is very essential. Hence, the inputs, functions, data structures and users of the system under consideration are described below.

2.1.1 Input Information Currently Used by the System to Prepare and Issue Passport, Visa and Residence Permit

2.1.1.1 Requests for Passport and Visa by Ethiopian Nationals

Request for passport and visa by Ethiopian nationals may take any one of the following forms:

(a) Passport/Laissez-Passer;

(b) Passport/Laissez-Passer and Exit Visa;

(c) Exit Visa;

(d) Extension of Exit visa; and

(e) Renewal, Correction, or Replacement of a Passport.

Before each of these requests are processed by the Department, an applicant is required to furnish an ID card and certain clearance documents, depending on his/her specific request and current occupation. At present, the Department classifies all Ethiopian applicants on the basis of their current occupation into three major groups. These are:

(1) Employees' of Government, International, Regional and Non-Governmental Organizations (NGOs); (2) Businessmen; and (3) Others.

Identity card and other supporting clearance papers required from each group of applicant are summarized in Table 2.1.

Table 2.1

DOCUMENTS REQUIRED FROM ETHIOPIAN APPLICANTS REQUESTING PASSPORT OR EXIT VISA

TYPE OF REQUEST	TYPE OF APPLICANT		
	Employee's of Government/Regional and International organizations	Businessman	others
A. Passport	-Id Card issued by the employer organization -3 Passport-size Photographs	-Renewed trade license -3 Passport-size Photographs	-Id Card issued by 'Kebele' -3 Passport-size Photographs
B. Passport & Visa	For Official purpose In addition to the requirements stated in 'A':- 1. official letter from the employer organization which states the purpose of the travel. For private purpose In addition to the requirements stated in 'A':- 2. Official annual leave letter from the employer organization which indicates the specific duration.	the same as above	the same as above
C. Exit Visa and Extension of Exit Visa	For official Purpose -Valid Passport and the official letter indicated in 'B' section 1 above For Private Purpose -Valid Passport and the official annual leave mentioned in 'B' section 2 above	valid Passport	valid Passport
D. Replacement of Passport	The old Passport to be replaced by a new one and 3 Passport-size photograph	the same	the same

E. Renewal of Passport	The Passport to be renewed	the same	the same
F. Correction of Personal Information indicated in Passport	-The Passport to be corrected -If the correction is a major one such as:- . change of name; legal document . change in employment; an official letter from a former employer are required	the same except that no document is required for change in employment	the same

Upon inspecting these documents the Department, depending on the type of request, issues the following three types of forms to collect information from each applicant.

(a) New Passport and/or Exit Visa Request

An Ethiopian national applying for **Passport/Laissez-Passer** and **Exit Visa**, or **Passport/Laissez-Passer** only or **Exit Visa** only from the Department is given an empty form labelled Ethiopian's Passport and Visa Application Form (see Appendix A, Form 1).

Since an applicant requesting only Exit Visa must possess a valid Passport, he/she is not required to fill the entries for Passport information shown in the form. Similarly, an applicant requesting only Passport/Laissez-Passer is not supposed to fill entries in the form which contain visa information.

The completed and signed form is then collected from the applicant for the subsequent actions by the respective sections of the Department.

(b) Passport/Laissez-Passer Renewal, Correction, or Replacement Request

An applicant requesting **renewal, correction or replacement** of a **Passport/Laissez-Passer** is given an empty form labelled Passport/Laissez-Passer Renewal, Replacement and Correction Form (see Appendix A, Form 2). Each of these requests may be presented with or without Exit visa. Supporting documents required from each applicant are shown in Table 2.1. When this form is filled and signed by the applicant, it is collected by the Reception Section for subsequent processing.

(c) Exit Visa Extension Request

An applicant requesting **extension of Exit Visa** is given an empty form labelled Visa Extension Application Form (see Appendix A, Form 3). To process the request, supporting documents required from the applicant are indicated in Table 2.1.

2.1.1.2 Request for Residence Permit by Foreign Nationals

(a) Residence Permit Request

Under Proclamation 271/69, a foreigner may seek residence in Ethiopia as :

.an employee of government organization;

.an employee of private business enterprise;

.an entrepreneur in private business or industries or in other independent enterprise;

.a professional to serve in private schools and hospitals;

.a person with or without dependants and without being engaged in any gainful activities;

When a Residence Permit is sought by a foreigner, the request is reviewed in accordance with the country's labour law by an ad-hoc committee. This committee comprises members from different government ministries (in which the Immigration and Consular Department is also a party) and "determine whether or not an Ethiopian or Ethiopians in sufficient number are available to do the work or occupy the post of such a foreigner" before a Work Permit is granted (Proclamation 271/69).

After this has been established by the committee, Work Permit or License as well as Entry Visa should, normally, have been issued by the Ethiopian diplomatic and consular missions abroad, i.e., before the foreigner comes to Ethiopia. But this doesn't happen in practice. Therefore, the following procedures are being used to issue Entry Visa, Work Permit/ License and, then, Residence Permit to a foreigner who intends to reside in Ethiopia.

Once employment of the foreigner in Government organizations or his/her engagement in any private business activities is approved by the ad-hoc committee, the person enters to Ethiopia through Tourist or Business visa issued to him/her at Bole airport. Subsequently, the organization (Governmental or Non-Governmental) which brought the foreigner requests the Ministry of Labour and Social Affairs, Civil Service Commission, Ministry of Trade or the Investment Office for Work Permit or License to be granted to the foreigner, depending on the type of work he/she is going to be engaged in. The requested Work Permit

or License is then given to the foreigner and the mentioned Government Ministries and Departments send a letter to the Immigration and Consular Main Department requesting Residence Permit for the foreigner.

When this letter is received, the Immigration and Consular Department orders its branch office at Bole to cancel the previous Tourist or Business Visa issued to the foreigner at the time of entry, and replace it with an Entry Visa. It is only when the foreigner obtains Entry Visa and Work Permit/License that the process for Residence Permit commences. Depending on the occupation of the foreigner in Ethiopia, information required by the Department to process and issue Residence Permit is summarized in Table 2.2.

TABLE 2.2

DOCUMENTS REQUIRED TO GRANT RESIDENCE PERMIT TO FOREIGNERS

Occupation of the applicant in Ethiopia	Documents required from the applicant
1. Employees of NGOs	-Valid Passport -Work Permit -Letter from the Ministry of Labour and Social Affairs
2. Employee of Government organizations	-Valid Passport -Letter from Civil Service Commission
3. Businessman/ Investor	-Valid Passport -Trade or Business License -Letter from the Ministry of Trade or Investment office
4. Student	-Valid Passport -Letter from the academic institution

Upon verification of these documents, the foreigner is provided with an empty form labelled Residence Permit Application Form (see Appendix A, Form 4) to collect information from him/her to process and issue the requested Residence Permit.

(b) Residence Permit Renewal Request

According to Proclamation 271/69, Residence Permit issued to a foreigner will remain valid for only one year from the date of registration. Any resident foreigner covered by this proclamation who wishes to extend his/her stay in Ethiopia is, therefore, required by the law to renew his Residence Permit provided that his/her Work Permit/License is also renewed. Upon the presentation of a renewed Work Permit or License, the applicant is given an empty form labelled Residence Permit Renewal Application Form (see Appendix A, Form 5) to collect information and process the request.

2.1.1.3 Request for Visa by Foreign Nationals.

Foreign nationals who request visa from the Department are classified as **resident** and **non-resident** foreigners.

(a) Visa Request by Resident Foreigners

Visa request by a foreign national resident in Ethiopia may take one of the following forms:

. Exit visa (when the foreigner wishes to leave Ethiopia for good);

. Re-entry visa (when the foreigner wishes to leave Ethiopia for a temporary period);

. Extension of re-entry visa (when the foreigner wishes to extend his/her stay abroad).

Information required by the Department from a resident foreigner to issue Exit and Re-entry or to extend Re-entry visa depending on his/her present occupation in Ethiopia are summarized in Table 2.3.

TABLE 2.3

DOCUMENTS REQUIRED TO ISSUE VISA TO RESIDENT FOREIGNERS

Type of Request	Occupation	Document Required from the applicant
Exit/Re-entry Visa	Businessmen (Investors)	-Valid Residence Permit -Valid Passport
	Employees of Government Organization	-Letter from employer -Valid Passport -Valid Residence Permit
	Student	-Letter from the School -Valid Passport -Valid Residence Permit
	Employees of NGOs	-Letters from the employer -Valid Residence Permit -Valid Passport
	House wives/ Dependants	-Valid Residence Permit of the head of the house hold -Valid Residence Permit of the dependant/wife
Extension of Re-entry Visa	For all resident foreigners	-Application letter -Valid Residence Permit

Upon inspection of these documents the resident foreigner is provided with an empty form labelled Visa Application Form for Resident Foreigners (see Appendix A, Form 6) to collect the information required to process and issue the requested Visa.

(b) Visa Request by Non-Resident Foreigners

Non-resident foreigners are aliens entering to the country for short time duration. Generally, non-resident foreigners are classified as **tourists** (including transiting foreigners) and **non-tourists**. Non-tourist foreigners are usually referred to, by the Department, as **Visitors**. These may include foreign nationals entering to the country for short time official, business, training, vacation and other purposes. Currently, Business Visa is issued to visitors at port of entry upon the request of the Governmental or Non-Governmental Organization which invited the visitor. On the other hand, tourists and foreigners transiting through Ethiopia may obtain Tourist and Transit Visa, respectively, from the Ethiopian diplomatic and consular missions abroad or at ports of entry which will remain valid, upon issuance, for not more than three months for Tourist Visa and seven days for Transit Visa.

When a non-resident foreigner wishes to extend his/her stay in Ethiopia, the Department may, if it deems it appropriate, grant such an extension. It is empowered by law, where serious or unforeseen difficulties arise, to extend the validity of Tourist Visa for total of nine months and Transit Visa for total of 15 days.

To process and issue Visa requested by a non-resident foreigner, the Department provides an empty form labelled Visa Extension Application Form for Non-Resident Foreigners (see Appendix A, Form 7) to the applicant to collect information for subsequent action.

2.1.1.4 Request For Restriction on Departure or Entry of Persons From or to Ethiopia.

Other than requests for Passport, Visa and Residence Permit, the major category of information used as an input by the Department is the list of Ethiopians sought by national law enforcement agencies whose departure from Ethiopia must be denied and list of undesirable foreigners whose entry to Ethiopia must be prevented.

(a) Outgoing Persons Watch List

The Ministry of Interior (now Ministry of Internal Affairs) is empowered by proclamation 271/69, article 9, to deny an exit visa to an Ethiopian national:

(a) if a court of competent jurisdiction has ordered that the person should stay in Ethiopia;

(b) if a court of competent jurisdiction has summoned the person to appear within one month as a witness in a pending civil or criminal case.

The list of such persons sent to the Department from different courts of competent jurisdiction is organized and maintained on a card index and is kept at the Department's head office and at Bole Airport to control and prevent departure of persons on a lookout.

(b) Incoming Persons Watch List

Under Proclamation 271/69 any foreigner who has been declared an "undesirable" is not allowed to enter Ethiopia mainly because if the said foreigner:

- has no visible means of income and is believed that he is likely to become a public burden;
- has been convicted of crime in a foreign country or in Ethiopia;
- has been found guilty of disturbing or endangering security of the country;
- has been found guilty of promoting immorality in Ethiopia.

Currently, the main category of undesirable foreigners being watched by the Department are international criminals whose name is circulated by the Interpol around the world. This list is prepared by the Department and is kept at the head office and at entry ports, mainly at the Bole Airport.

2.1.2 Processes Currently Performed by System to Prepare and Issue Passport, Visa and Residence Permit.

To process and issue Passport, Visa and Residence Permit, the Department currently performs the functions described below:

2.1.2.1 Reception Function

An Ethiopian or foreign applicant presents his/her request for Passport, Visa or Residence Permit to the local and foreign desks under the Reception Section and the reception staff check if each applicant has the necessary documents indicated in Tables 2.1, 2.2 or 2.3 to support his/her request. If the documents supplied by the applicant are incomplete, unacceptable or the reception staffs have any doubt on authenticity of the papers, the request is immediately rejected. If the documents are complete and acceptable, the reception staffs, depending on each individual's request, provide the forms indicated in Appendix A to the respective applicants.

The application forms are completed by the applicant himself/ herself under the supervision and, if necessary, guidance of the reception staff. The completed form, photocopies of the identity card and the other required documents are placed in a paper file by the applicant himself/herself and collected by the reception staff.

The staffs, then, check if each form is correctly and clearly filled out and the information provided in the form does conform with the personal particulars indicated on the applicant's

identity card, the Passport (if he or she has) and other supporting documents. If it doesn't, the request is rejected.

The complete and satisfactory applicant's file is passed on to the Watch List Record unit where name of the applicant is checked in the watch list to ensure that no travel restriction has been filed against the person by any court. If the applicant is found to be a black listed person, the request is automatically rejected.

The Watch List clerks put 'Checked' mark on the application form of an eligible applicant, and return the file to the reception staff. Based on the request and supporting documents supplied by the applicant, the reception staffs, then, decide the type of Travel Document/Visa or Residence Permit allowed to the person, complete the entries in the application form and pass on the file to the Cash Reception unit situated within the Reception Section. Each applicant is then charged on the basis of the fees payable for Travel Document, Visa and Residence Permit (see Appendix B).

When a payment is effected, cash receipt is prepared in three copies. Original copy of the cash receipt and an appointment card prepared by the reception section are given to the applicant. The second copy of the cash receipt is attached to the applicant's file, and the third copy is kept with the cashiers.

After the payment process is completed, the reception staffs classify the files by type of request, record name of the applicants and their respective request in a multiple copy form and distribute the files to the Passport, Visa and Foreigners' Registration Sections for subsequent processes as described below.

2.1.2.2 Passport Request Processing

The Passport Section receives confirmed requests for new Passport/ Laissez-Passer, and renewal, correction or replacement of previous Passport/Laissez-Passer from the Reception Section. Upon reception, the Passport staff first check the files against the list prepared by Reception Section to make sure that the files of all applicants listed in the form have been received and are complete.

Name of each applicant is again searched in the watch list record maintained at the Passport Section for double checking of persons who are not to be allowed to leave the country for legal reasons. Passports that have been reported as lost by applicants are also controlled at the Passport Section to prevent from being reused. (The watch list record maintained under the Passport Section is the same as the one kept by the watch list record unit located adjacent to the Reception Section).

The checked files are then passed on to the Passport Preparation Unit and based on the request the clerks prepare and write new Passport or renew or correct a previous Passport. When completed, the Passport entries indicated in Form 1 are filled and each Passport is signed and sealed by the head of the Passport Section.

For those applicants who have requested both Passport and Exit Visa at the same time, the new Passports together with the files are passed on from the Passport Section to the Visa Section for subsequent processing. Otherwise, new Passports are recorded at the Passport Section and directly passed on to the Dispatch Section (without passing through the Record

Section) and are given to the respective owners. The application forms and other supporting documents of the applicants are sent to and kept at the Archive Section.

2.1.2.3 Visa Request Processing

The Visa Section receives files of applicants from two sources - the Reception Section and the Passport Section. Files coming from the Passport Section are requests for Passport and Exit Visa by Ethiopian applicants as described above. On the other hand, those coming directly from the Reception Section include files of

(a) Ethiopian applicants who request new or extension of Exit Visa, (b) resident foreigners who request Exit or Re-entry Visa and (c) non-resident foreigners who request extension of Visa.

When received, the files are checked against the list prepared by the Reception Section to ensure that all the requests listed in the form have arrived and are complete.

Once the checking process is completed, the staffs prepare the requested Visa and fill the entries in (a) Form 1, Form 2 and Form 3 for Ethiopian Visa applicants, (b) Form 6 for resident and (c) Form 7 for non-resident foreigners. Once the Visa is prepared, the following records are created at the Visa Section.

New record is created for all Ethiopian applicants to whom Visa has been issued for the first time with a file number assigned to the record of each applicant. The file number is supposed to be unique, though not in reality, which would serve as an index for the card

created and maintained by the Record Section. The list and Visa details of all other Ethiopian applicants who have taken Visa more than once are recorded in another file. Detail of resident foreigners to whom Exit or Re-entry Visa has been issued is recorded in a separate file. Likewise, a separate record is created for tourists and additional card known as "Immigration Exit Card" holding detail information about non-resident foreigner who entered to the country temporarily is prepared and kept at the Visa Section.

When the record creation process is completed, the Visa issued to each applicant is signed and sealed by the head of the Visa Section, and all finished Passports are sent to the Dispatch Section. Application forms and all other supporting documents of the applicant are passed on to the Record Section.

The Passport Dispatch staffs check and receive the finished Passports against the list prepared by the Reception Section and then handed over to the respective owners. Before handing over of the Passports takes place, the Dispatch staff first establish identity of each person and record his/her name and signature in a Passport Dispatch Form.

The staff at the Record Section sort all the files received from the Visa Section into those of Ethiopians and foreign nationals. A new card index is created for an Ethiopian to whom Visa is issued for the first time. For a citizen who took Visa more than once, the Visa information is updated on an already existing card. Visa issued to a resident foreigner is updated on a residence permit card created at the time when a residence permit was issued to the foreigner as discussed in section 2.1.2.4.

After the record creation and updating process by the Record Section is completed, the files are sent to Archive Section where they are again recorded and physically kept.

2.1.2.4 Residence Permit Request Processing

The Foreigners' Registration Section checks and receives confirmed Residence Permit application form, Passport and other relevant documents of the foreign applicant from the foreigners' desk under the Reception Section. The official in charge of the Foreigners' Registration Section reviews validity of the request and makes his final decision as to accept or reject the request.

If the request is approved, residence identity card is prepared for the foreigner and the ID is registered in Residence Id Registration Book. When this is completed, another card index is created on which detail information about the foreigner is recorded. Then, a file number is assigned and the residence application form and all other relevant documents are passed on to another unit where a master record of the resident foreigner is again created and maintained.

After detail information about the foreigner is registered in the master file, the Residence ID card, bearing photograph and signature of the applicant as well as signature of the official and seal of the Department, is given to the foreigner through the Dispatch Section. The residence permit card is sent to and kept at the Record Section. The file which holds the Residence Permit application form and other supporting documents of the applicant are passed on to and kept at the Archive Section.

2.1.3 Information Currently Held by the System

As described in the previous discussions, apart from the application forms indicated in Appendix A, the following cards and files are used by the Department as permanent data stores which hold information on black listed persons, issued Passports, Visas and Residence Permits by the (a) Watch List, (b) Passport, (c) Visa, (d) Record, (e) Foreigners' Registration and (f) Dispatch Sections.

Watch List Cards and Files: These files and cards are created and maintained by the Watch List units located adjacent to the Reception Section and within the Passport Section containing information about Ethiopian and Foreign Nationals on a look out.

Record of New Passport Issued to Nationals: This is a simple paper file created and maintained by the Passport Section which holds full name and Passport number of the person for whom a new Passport is prepared.

Card Index for Passport and Visa Issued to Nationals: This card is created and maintained by the Record Section holding information on issued Passports and Visas to Ethiopian nationals.

Record of Exit Visa Issued to Nationals: Two files are created and maintained by the Visa Section, one for newcomers and another file for applicants taking Visa for the second time or more.

Record of Exit/Re-entry Visa Issued to Resident Foreigners: This file is created and maintained by the Visa Section holding Visa information issued to all resident foreigners.

Record of Visa Issued to Tourists: This file is created and maintained by the Visa Section holding Visa information issued to all tourists.

Immigration Exit Card: This card is created and maintained by the Visa Section holding Visa information issued to all non-resident foreigners, both tourists and visitors.

Residence Id Registration Book: This book contains information on residence ID issued to resident foreigners and is maintained by the Foreigners Registration Section.

Resident Foreigners Registration Card Index: This card is created by the Foreigners Registration Section when a residence permit is prepared and it is maintained by the Record Section.

Master Record of Resident Foreigners: This master record is created and maintained by the Foreigners Registration Section and holds detail information about all resident foreigners living in Ethiopia.

Passport Dispatch Record: This record is created at the Dispatch Section to register name and signature of applicants who have taken their Passports.

Disembarkation Card: All passengers entering Ethiopia are required to provide information

describing their identity, purpose of entry and address while in Ethiopia in a Disembarkation card supplied to them at the point of entry. The content of this form is copied to an Incoming Passengers List' and sent to the head office.

Embarkation Card: All persons departing from Ethiopia are also required to provide information about their personal identity, and country of destination on an Embarkation From supplied to them at the port of exit. The content of this form is copied to an Outgoing Passengers List and sent to the Department's head office.

The purpose of these two files is to help update the record of Ethiopian and foreign nationals to whom Visas have been issued and to create records on new entrants to the country. However, apart from satisfying some ad-hoc queries, they are not being properly utilized for the purpose they were intended. Embarkation cards are used by the Foreigners' Registration Section to check that non-resident foreigners who entered to the country with Tourist and Transit Visa have returned.

2.1.4 Users Categories and Their Respective Tasks

Many of the activities performed by the Department to process requests for Passport, Visa and Residence Permit are, basically, clerical in nature. Hence, the major potential users of information under the current system are, mainly,

(a) Reception, (b) Passport, (c) Visa and (d) Residence Permit clerks who need to have easy and fast access to records and files maintained by the system to discharge their respective duties. The most important users of information, therefore, include the following:

Inspectors and Reception Clerks: Inspectors and clerks at the Reception Section spend much of their time inspecting individual requests for Passport, Visa and Residence Permit applying the existing immigration and consular laws and regulations of the country to each applicant's case and detecting forgery and fraud. This task is the most challenging and sometimes demanding. At present, the reception staffs have no access to the records on issued Passports maintained by the Department to determine whether a particular applicant is eligible or not. Due to this problem, their decision is purely based on intuition and common sense. For example, they may refuse to issue a Passport to an individual applicant if they recognize (which may not always be correct) that the person is attempting to take a Passport for the second time.

Watch List File Clerks: Users in this category are responsible for checking the name of applicants in the watch list cards and file maintained by the system about citizens, who are sought by national law enforcement authorities and undesirable foreigners whose entry to Ethiopia must be prevented.

Cashiers : The main task of cashiers is to collect service fees for Passport, Visa and Residence Permit depending on each applicant's request and his/her present occupation.

Passport Clerks: The major activities of users in this group include preparing and writing new Passport, renewing, replacing and correcting a previously issued Passport and recording a newly prepared Passport.

Visa Clerks: The main tasks of users in this group include preparing and issuing different

types of Visas to Ethiopian and foreign applicants, creating and maintaining records of issued Visas and producing various types of statistical reports.

Foreigners' Registration Clerks: The main functions of users in this category are to register and issue Residence ID to all non-diplomatic foreigners living in Ethiopia and to create, maintain and update records of all non-resident foreigners who enter to Ethiopia temporarily.

Record Clerks : The main task of users in this group include creating and maintaining (updating, deleting, inserting, etc.) of records of citizens to whom passport and visa have been issued as well as to maintain and update the record of foreigners to whom Residence Permit has been granted.

Archive Clerks : The main activity of users in the archive section is to record and physically store, maintain and retrieve, if required, the files of Ethiopian nationals to whom Passports and Visa have been issued and foreigners to whom Residence Permit or Visa have been granted.

Passport Dispatch Clerks : The main task of users in this group is to check, register and hand over the finished Passports to the respective owners.

2.1.5 Current Physical Data Flow Diagrams

Basic operations of the existing system have been covered in some detail in the preceding sections. In this section, output of the analysis is documented using one of the most widely used structured tools of systems analysis and design known as Data Flow Diagram.

Without some form of graphic representation of the overall flow of processing, data and information within the system under investigation and its environment, it would be difficult to assess the accuracy of the knowledge of the present system and completeness of the information gathered during the interview and observation. Data Flow Diagrams are therefore useful in this regard which greatly help in describing :

-how information flows into, within and leaves the system;

-what function transforms the information in the system; and

-where information is kept within the system.

While documenting an existing system, Data Flow Diagrams help to show the boundaries and scope of the system being represented, thereby ensuring that all the information flows, stores and activities within the system have been considered.

The standard symbols which form the basic components of a Data Flow Diagram are the following:

Source/destination :- This refers to an entity which provides information to or receives

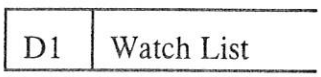
information from the system. Sources/destinations are represented by a rectangle containing name of the source or recipient inside it as shown below.



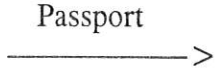
Process :- This, also known as 'transform', identifies the function that transforms data within the system. Processes in Data Flow Diagrams are represented by a circle, commonly referred to as 'bubbles', each containing the name of the process and an identifier as shown below.



Data store :- Data store is where data is deposited or stored by the system whether in cards, files, or in a magnetic media. Data stores are represented by an open-ended box as containing an identifier prefixed with a capital 'D' and descriptive name of the information held inside it as shown below :



Data flow :- Data flow represents package of information flowing between data stores, process and sources/destinations on the Data Flow Diagram. A data flow is represented by an arrow denoting the direction of the flow and annotated with the name of the document or information flowing as shown below:



The current physical Data Flow Diagrams shown below are used to represent the Passport, Visa and Residence Permit issuance system modelled in its present implementation without considering the physical environment in which data flows or the physical device in which data is stored. Data Flow Diagrams are also used at the general design stage presented in Chapter Three, first to define the logical system, then, to show the design alternatives for the proposed system, and finally to represent the recommended system.

The current physical Data Flow Diagrams presented in this section were first drawn by the analyst and further refined through series of discussions with the users until they represent the existing system accurately.

Hence, Figure 2.1 containing a single bubble is the Context Data Flow Diagram which represents the entire system under investigation. The bubble is connected through data flow lines to sources and destinations. As shown in the figure, the system takes input from applicants, courts, the Interpol and its branch office at Bole, processes the input and finally releases outputs in the form of finished Passports, Visas and Residence Permits to applicants and list of persons who are not allowed to depart from and enter to Ethiopia to the branch office at Bole.

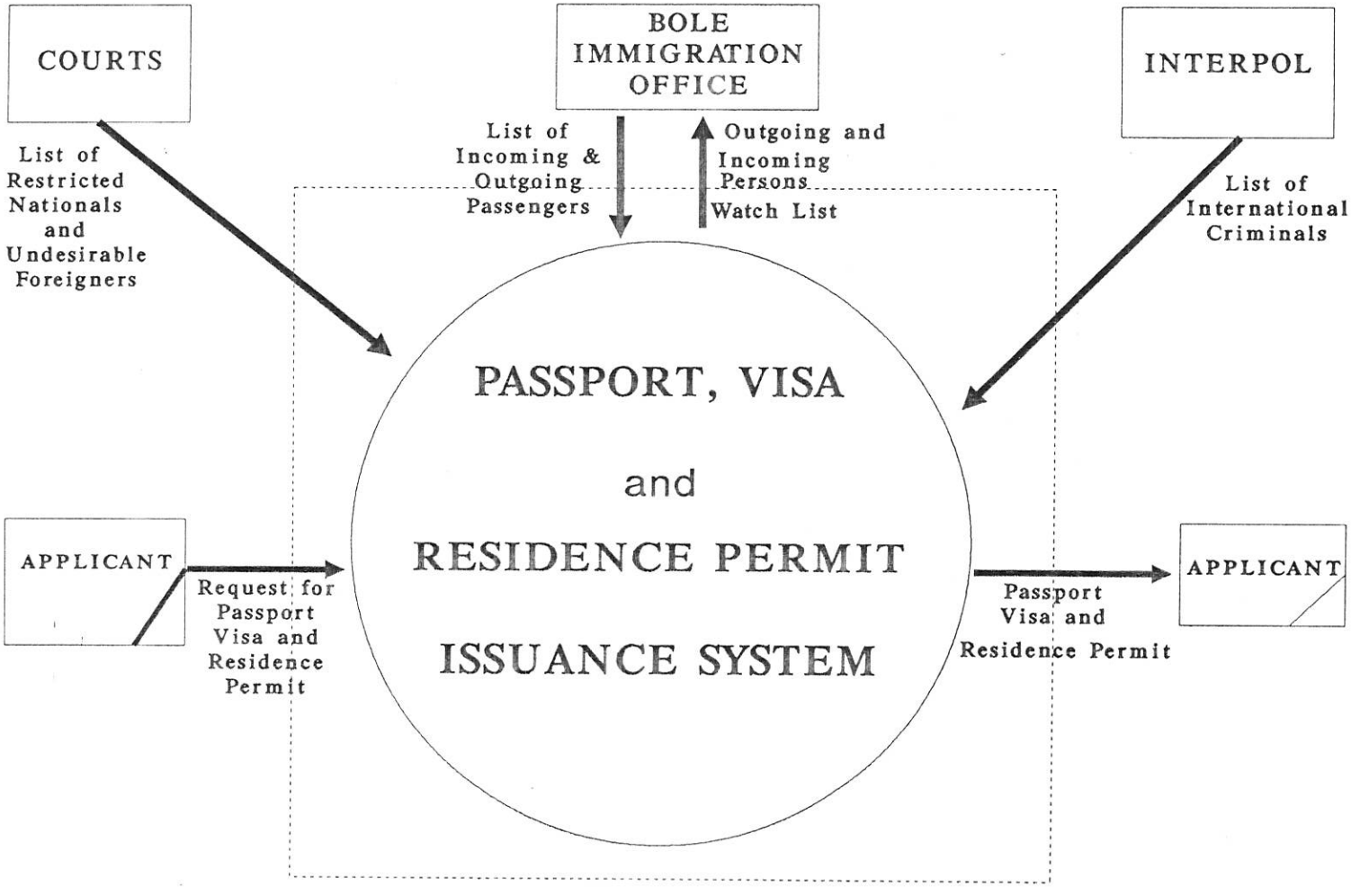


Figure 2.1 Context DFD of the Current Passport, Visa and Residence Permit Issaunce System

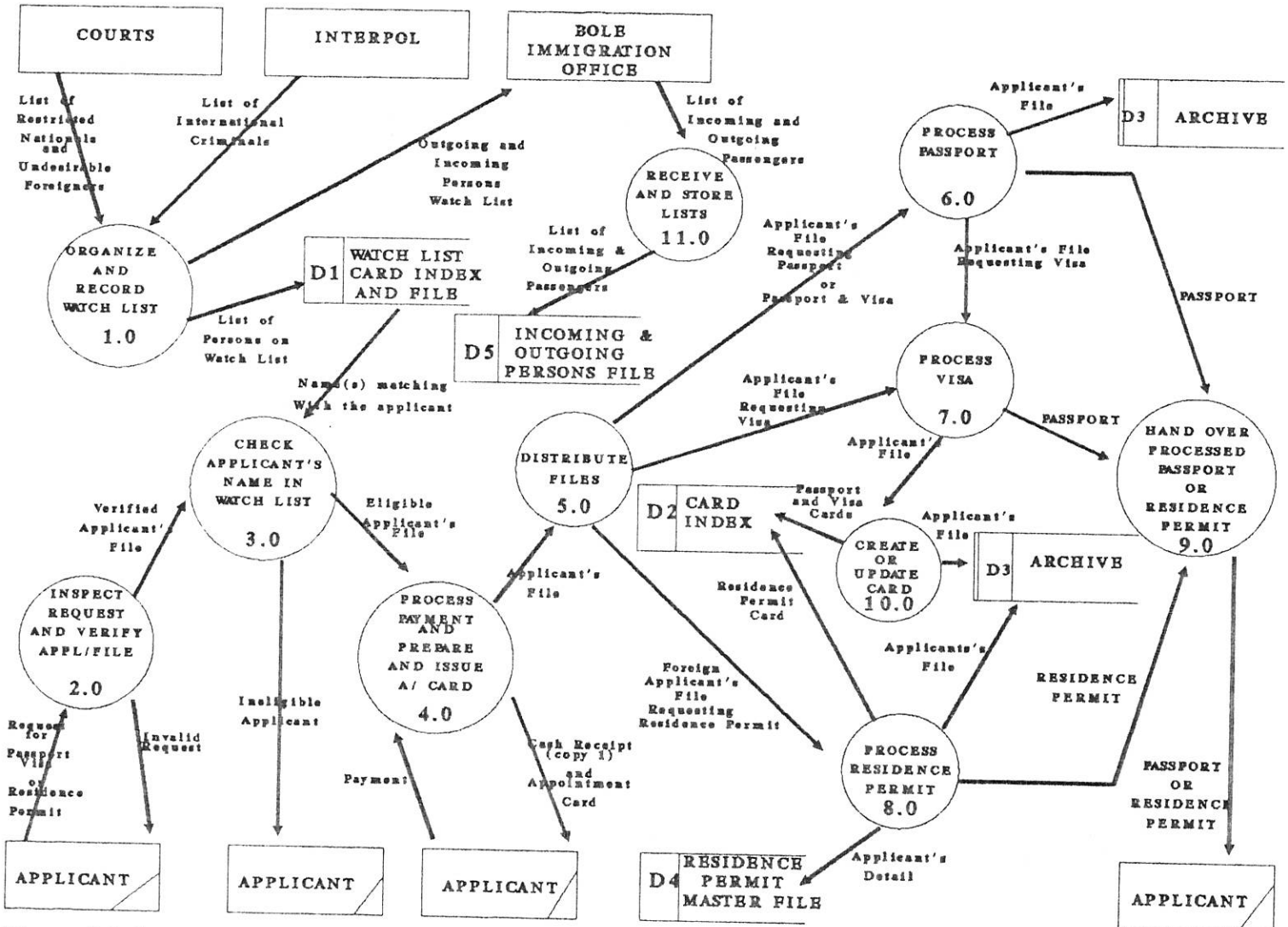


Figure 2.2 Overview DFD of the Current Passport, Visa and Residence Permit Issuance System

Figure 2.2, the overview Data Flow Diagram, represents the major processes within the Passport, Visa and Residence Permit issuance system. It shows the sources/recipients of data, processes associated with data stores and data flows in the current system. Figure 2.3, 2.4, and 2.5 are representations of bubble 6, bubble 7 and bubble 8 in the overview Data Flow Diagram for Passport, Visa and Residence Permit processes, respectively, broken down into more detailed activities. Each process in the context Data Flow Diagram can be decomposed in a similar way into its detail component activities.

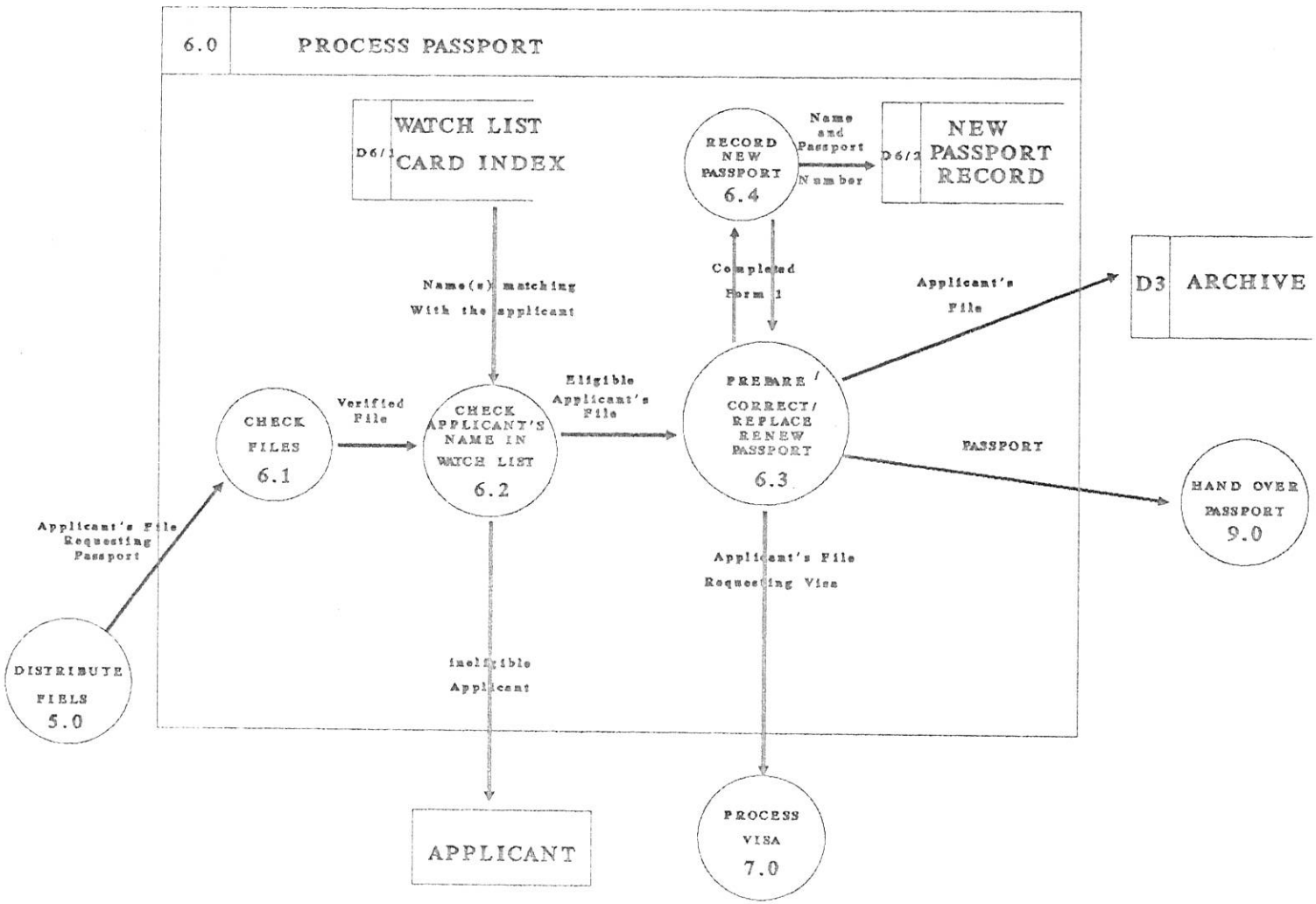


Figure 2.3 Process Passport (explosion of bubble No. 6.0)

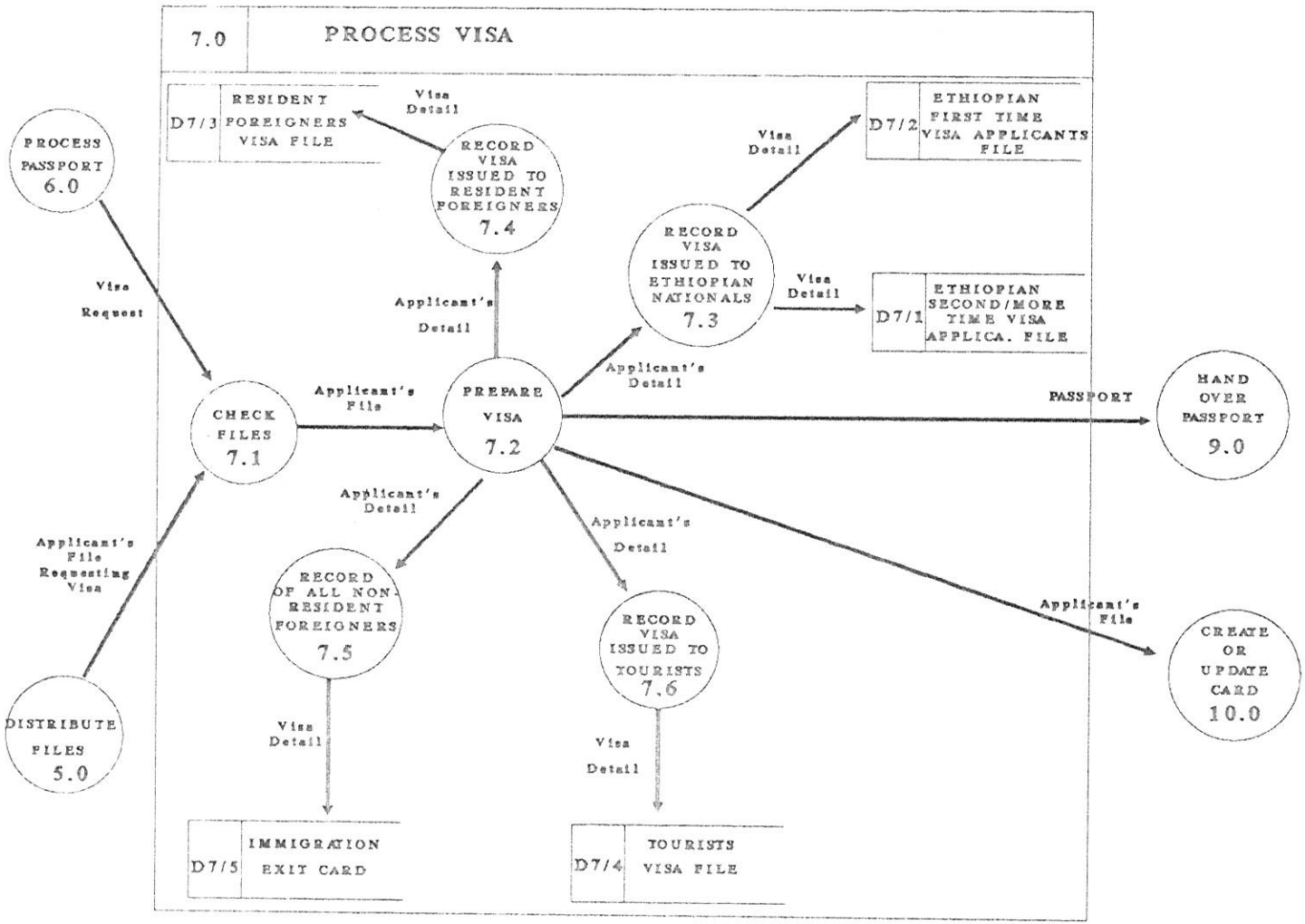


Figure 2.4 Process Visa (explosion of bubble No. 7.0)

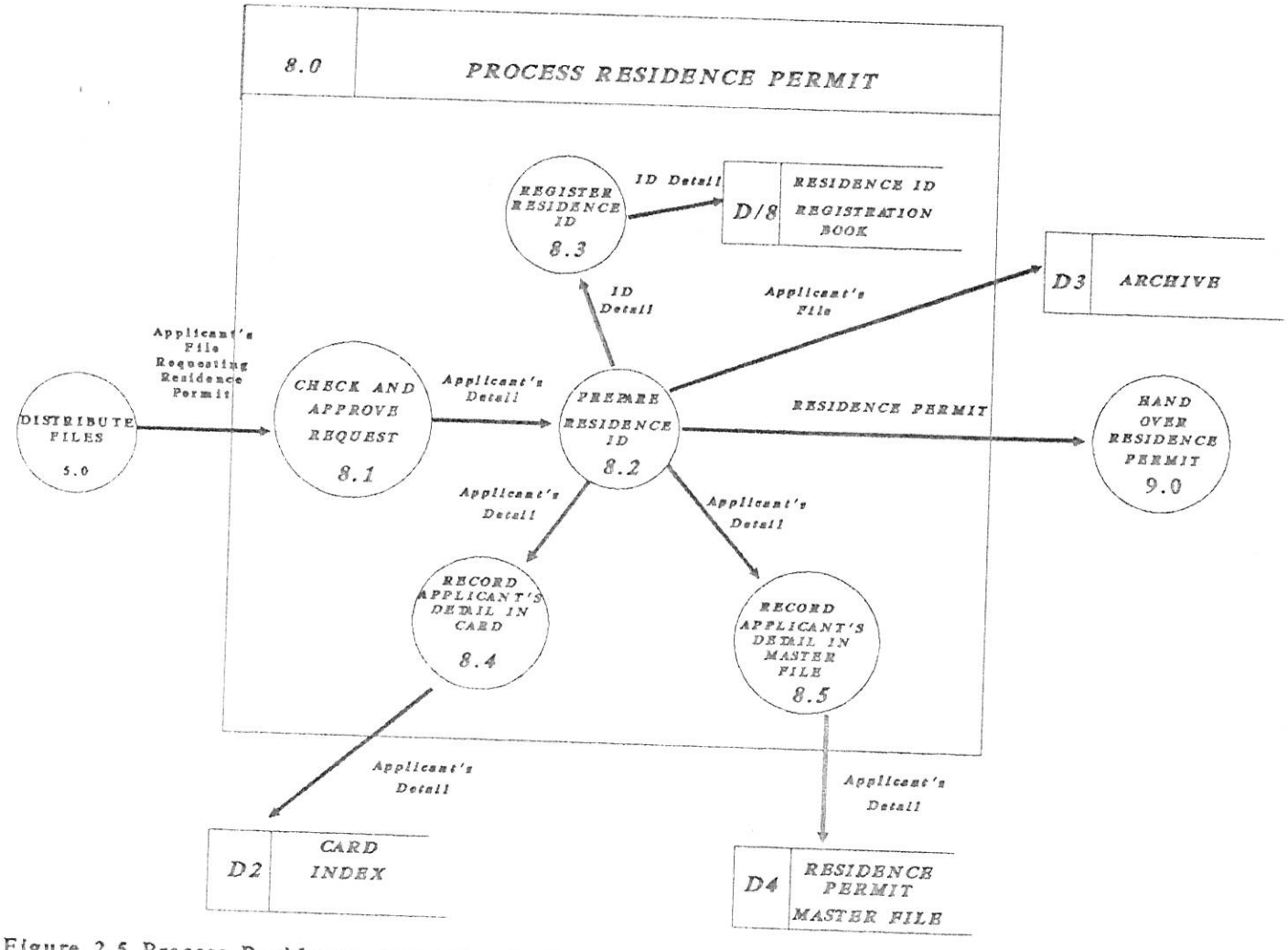


Figure 2.5 Process Residence Permit(explosion of bubble 8.0)

2.2 EXISTING COMPUTER RESOURCES IN THE DEPARTMENT

2.2.1 Head Office

Currently, the following hardware and software resources are available at the head office:

1. HARDWARE

a) Minicomputer 1

Make/model	HP 3000Lx
RAM	4 MB
Hard Disk	340 MB
Operating System	MPE V
Ports	8

b) Microcomputers

Make/model	VECTRA CS	AST Premium II
Quantity	2	1
Processor type	80286	80386
RAM	640 KB	8 MB
Hard Disk	20 MB	1 GB
Bit Processor	10/8	36/16
Clock Speed	10 MHZ	25 MHZ
Operating System	DOS	DOS

c) Printers

EPSON-1050	1
Desk Jet Plus	1
Rugged Writer	1

d) Others

UPS (minute man) 30 minutes	1
MODEM COMPUDYNE 2400	1

2. Software

a) Microsoft Paradox
b) Turbo Image 3000 (HP3000)
c) Word Processor 5.1
d) Dbase III plus

The Computer Section, operating under the Passport Main Section, is one of the most poorly organized and staffed units of the Department. There are four professionals working in this unit who did not go through adequate formal computer-related training and most of them have acquired the skill of operating the existing facilities through self and on-the-job training. Only one staff has recently received a diploma in computer science.

At present, the unit is not providing useful service to the Department to help facilitate its day-to-day operations. Recently, it has started retrospective conversion of records of nationals to whom Passports and Visas have been issued. So far it has managed to convert only 30,000 records - far less than half of the Passports or Visas issued annually, and this is only record of nationals who have taken both Passport and Visa, since the card index used as a source of data for the conversion doesn't contain record of nationals who have taken Passport without Visa.

Furthermore, clerks at the Visa Section frequently assign duplicate file numbers which has always been a problem for the Computer Section to maintain records in the computer database.

2.2.2 Bole Immigration Office

The Immigration branch office located at Bole Airport, has acquired 8 80386 AST Premium II IBM compatible microcomputers in the form of donation. Configuration and the task to which these microcomputers are allocated is as described below :

a) 6 with 2 MB RAM, 40 MB hard disk and 20 MHz (Data entry workstations, three at the entry and the remaining three at the exit terminals).

b) 1 with 8 MB RAM, 250 MB hard disk and 25 MHz (Supervisor workstation).

c) 1 with 8 MB RAM, 1 GB HARD DISK and 30 MHz (File server)

The microcomputers are networked and use Novell netware network operating software. The application software being used to monitor incoming and outgoing passengers is known as Modular Border Control System.

The Modular Border Control System Software

The Modular Border Control System software developed by the USA based Security Management, Inc. is a package specially designed for collecting and processing travel transactions at check points. As described in the manual provided by the supplier, the system has the following three main components:

- The Portable Units, used at sites with relatively little traffic or border checkpoints that are frequently relocated;
- The Networked Systems, used in moderate-to heavy-traffic situations where multiple operator stations are required.
- The Central Systems used to provide administrative control of the databases on the Portable Units and Networked Systems.

Out of these, the Networked System is currently installed at Bole Immigration check point to register incoming and outgoing passengers. Supplier of the system claims that the

Networked Systems application software runs on any standard micro-computer and has been successfully utilized on computers manufactured by IBM, AST and GRID. It consists customs software for collecting and processing travel transactions which allow terminal operators to process information as it is collected. When information is entered by an operator, the program performs a number of functions in two databases known as the watch list database and history database.

Watch List Database : This database contains names of persons being sought by national law enforcement authorities. The list can be arranged by name and Passport number in the database so that information can be searched and retrieved either through a name or Passport number of the person transiting the border.

History Database : This database maintains a historical record of persons and documents that have transited the border or checkpoint. When a traveller transits through the system, the history database is searched to determine if this person and/or document has previously been recorded by the system. If there is a record of previous travel, the system allows the data entry operators to retrieve and review past transaction.

It has been almost three years now since the system was installed at the Airport. However, many problems have been encountered in using the system. First and foremost, the operators did not receive adequate training that would enable them to operate and run the system properly. Secondly, the system does not suit to the specific requirements of the Department and contains numerous fields which are not relevant, particularly to register Ethiopian nationals transiting through the Airport. Due to this problem the terminal

operators found it quite time consuming and boring to keep on pressing the 'enter key' to skip all the unnecessary fields.

Although these problems have been communicated to the supplier, it refused to modify the package to suit the requirements of the Department and has been unwilling to provide the source code for modification. The most serious problem pointed out by the system supervisor, and as later confirmed by the analyst, is that the system sometimes displays warning message on passengers against whom restriction has never been filed.

Due to this and the usual human problems that emerge along with the introduction of new technology, the inspectors at the entry and exit terminals prefer manual work to the computer based system.

2.3 PROBLEMS OF THE EXISTING IMMIGRATION AND CONSULAR SERVICE

All the activities of the Department described thus far, are done manually and the colossal amount of data related to issued Passports, Visa and Residence Permits are exclusively inspected, processed and stored through the use of human labour and paper alone. Records of issued Passports, Visa, and Residence Permits as well as watch list files are organized and stored in paper files and cards.

The manual and paper based system, apart from being slow, inefficient, and prone to many errors, has now made it difficult for the Department to deal with the increasing number of

requests for Travel documents, Visas and Residence Permits.

Upon closer observation and examination of the existing system, the following major constraints have been identified:

1. Redundancy and Higher Storage Cost

Record of one applicant is created and maintained by many sections at different places as described below.

1.1 When an Ethiopian applicant requests Passport and Visa for the first time, record about this same person is created and maintained (a) in the Passport Main Section (when the Passport is prepared and written); (b) in the Visa Main Section (when the Visa is prepared); (c) in the Record Section (where permanent record of the applicant is maintained); (d) in the Archive Section (where the application forms and documents of the applicant are recorded and physically stored); and (e) in the Dispatch Section (when the finished Passport and visas are handed over to the applicant).

1.2 Information about a resident foreigner is recorded when (a) residence ID is prepared, (b) when the residence card is created, (c) when master file is opened by the Foreign Registration Section, and finally (d) when application forms and other supporting documents of the applicant are sent to the Archive Section for storage. Similarly, two types of records are maintained about non-resident foreigners to whom Visa is extended by the Visa Section. Additionally, disembarkation Card sent by the Immigration Office at Bole is also maintained at the Foreigners' Registration Section to control tourists who entered to the country.

1.3 Other than the one maintained at Bole Immigration Office, record of persons who are not permitted to depart from or enter into Ethiopia is also maintained at two places in the head office (the watch list record unit located adjacent to the Reception Section and the Watch List unit situated within the Passport Section).

The creation of these multiple records, in most cases about the same person, has resulted in redundant files which in turn led to higher storage cost and to the maintenance of inconsistent data.

2. Retrieval Problem

Owing to the large volume of issued Passports, Visas and Residence Permits, and the problems associated with paper-based files, the multiple records created by the different sections cannot be easily accessed and retrieved.

2.1 It has become almost impossible to locate and retrieve the record of a person who has taken a Passport from the Department. It would take days to retrieve and check the record of an applicant from the Record Section before a Passport is prepared and issued. The difficulty to retrieve the files from the Record Section has therefore forced the Department to issue a Passport as requested after the name of the applicant is checked in the watch list files. At present, there is practically no way to control the issuance of Passport to the extent that it is not so much difficult these days for any citizen to hold more than one valid Passports on the same name, leaving aside those taken out under false identity.

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after the name of the applicant is checked in the watcl
ically no way to control the issuance of Passport to the e
lt these days for any citizen to hold more than one
aving aside those taken out under false identity.

2.2 It is time consuming and sometimes frustrating for the clerks at the Foreigners' Registration Section to go through the large volume of files to locate the record of a resident foreigner who has not renewed his/her Residence Permit and to know non-residents, particularly tourists, who attempt to stay in the country illegally.

2.3 Although the watch list cards containing the name of nationals who are not permitted to leave the country are arranged alphabetically, in the words of the clerk in charge "searching the name of a person that exactly matches with the name of the applicant from more than 4 thousand cards is the most stressful task." The watch list cards are frequently misplaced and 'lost' in the jungle of records. Clerks in the same unit who are responsible for maintaining list of undesirable foreigners also face similar problem. The file is very large and, strange as it may seem, it contains the name of undesirable foreigners ever sent to the Department since its creation in the 1940s.

3. Update Problem

Almost all Passport, Visa and Residence Permit records maintained by the Department require frequent updating.

3.1 An issued passport should be renewed after two years when requested and may need to be corrected or entirely replaced. The record of a person to whom an exit Visa has been issued should be updated when the person departs from or returns to Ethiopia, or renews his visa if he has not left the country within the period for which the visa remains valid. The information required for this purpose can be obtained from the list of incoming and outgoing passengers and disembarkation card sent by the Bole Immigration Office.

However, it is very difficult and requires extensive clerical effort to collect the data from these files. And even if this is possible, it is almost an impossible task to update the records on the cards. For all practical purposes, there is virtually no space to move around within the record section let alone to retrieve and update records for most of the cards are simply piled up on the floor.

3.2 The master record of a resident foreigner should also be updated (a) when residence permit is renewed (b) when there is a change in name, address, marital status, occupation, working place, nationality, birth of children, cases of death, new or renewal of passport (c) when Re-entry Visa is issued to the foreigner, (d) when the purpose for which the foreigner entered into the country comes to an end and extension of the Residence Permit is no longer required. Currently, all these changes are made on a single line space available for each record in the master file. Usually, some of the field values in the record are deleted and replaced with another one or new information may be added in to the record. This manual deletion and insertion of information onto the master file eventually renders the record of the foreigner illegible.

4. Problems of Producing Statistical Reports

Since the Department maintains huge paper files of issued Passports, Visa and Residence Permits and the data is stored at different places, it is difficult to collect data from these files to generate different statistical reports. For example :

4.1 It requires considerable clerical effort and time to prepare summary reports on issued visas classified in terms of occupational category, purpose of travel abroad, country of

destination, etc. of persons to whom visas have been issued (weekly, monthly, quarterly and annually). To prepare such reports the clerks at the Visa Main Section have to tally all the required data on a paper sheet daily.

4.2 The clerks at the Foreigners' Registration Section face similar problem to prepare different reports about resident and non-resident foreigners.

These problems represent where the operation of the current system is unsatisfactory and which additional features the users would like to see incorporated into the new system to be designed in the next chapters.

2.4 GENERAL DESCRIPTION OF THE PROPOSED SYSTEM

As we have seen in the analysis of the current operations, the major cause for most of the problems with the existing system is the creation and maintenance of multiple records by different sections at different places, and in most cases about the same person.

Since there is a substantially large volume of records maintained by each of these sections, users find it difficult to locate and retrieve record of a particular applicant to process Passport and Visa.

The proposed system should, therefore, at least avoid duplication of effort by providing central data depository to which all potential users involved in processing Passport, Visa and

Residence Permit are permitted access.

Since the Department handles and processes passport and visa requests ranging from 200 to 500 daily, multiple work stations will be required at the Reception Section to handle and process the large volume of request pouring to the Department. The workstations located at Bole airport should also be connected through a communication line to the head office to update or create records about incoming and outgoing passengers.

For the reasons discussed in Chapter 3, it is not advisable, both economically and operationally, to keep Passport and Visa records of Ethiopian nationals in separate files at different places.

Therefore, the record of Ethiopian nationals to whom Passports and Visas have been issued should be maintained in one database which will be available centrally to allow multiple access from the different workstations at the Reception, Passport, Visa and Sections, and the archive.

The **Watch List database** should be linked to the central database to enable automatic search in the databases by data entry operators from different workstations at the Reception Section.

To register foreigners entering into the country, another separate database, **foreigners database**, will be required which will contain data/information on both resident and non-resident foreigners. These are discussed in greater detail in the following chapters

CHAPTER THREE

GENERAL DESIGN

3.0 INTRODUCTION

In the systems analysis presented in Chapter 2, attributes of the current system have been described in greater detail. In the general design, also known as conceptual design (Davis and Olson 1984) or logical design (Ashowrth and Goodland 1990), we will concentrate on the logical structure of the new system.

Description of the current system, and the Current Physical Data Flow Diagrams used to represent it, reflect the physical attributes of the Department as it is currently organized. In order to design a new system, the physical constraints imposed by the way the Department is organized must be removed and a model of the required system is produced by redefining the functions and modifying the Current Physical Data Flow Diagrams. This leaves a set of logical processes and data structures showing the information requirements of the Department.

The logical design described in this chapter is not simply the logical abstraction of the existing system. It is extended to incorporate new features and services identified during the analysis required by the users.

Therefore, this chapter models the logical components for the new system, evaluates

different design alternatives for the proposed system and presents specifications of the recommended system in terms of its output, input, processing, control and security requirements at a general level.

3.1 LOGICAL VIEW OF THE PROPOSED SYSTEM

In Chapter 2, through analysis of the operations, and the Current Physical Data Flow Diagrams, we have seen how the current system works as well as what it does. We have also seen the current problems experienced by the users and described some of the features required of the new system to solve the problems and to meet the requirements of users.

In designing a new system, it is always important to explore what the existing system does, independently of how it does it (Ashworth and Goodland 1990). To look at what the system really does, it is necessary to examine the duplicate activities performed by the different sections of the Department. During the analysis we observed many unnecessary duplication of functions performed and information held by the different sections of the Department.

This means that resources are being wasted in doing the same job more than once and, above all, the redundancy has led to the problem of different version of the same data which are becoming inconsistent over time.

The main task of the logical design is, therefore, to unravel the duplications prevalent in the existing system and model the logical processes and data structures that are required by the system to perform the essential tasks set for it.

Logically, all the necessary data/information on Passports, Visas and Residence Permits should be captured and stored only once and all of the processes in the system should be able to access all or part of the stored information essential for their respective tasks. Similarly, under the logical view of the system, data flows, which carry data from one process to another, must hold only the information necessary for use within the relevant process.

Therefore, in this section the Current Physical Data Flow Diagrams presented to analyze the existing system are re-defined in the form of a logical view of what the current system should do by removing all the duplicate activities performed and redundant data stores maintained by the different sections.

Structured Systems Analysis and Design Method (SSADM) prescribes that the simplest starting point for logical design is to make the data stores logical (Ashworth and Goodland 1990). Once the data stores are made logical, the processes and data flows can easily be modelled and grouped to form a top-level Logical Data Flow Diagram.

3.1.1 Logical Data Stores

Each data store appearing on the Current Physical Data Flow Diagram for the existing system represents data stored in the permanent base of data (main data store). These include records held by the Watch List Units, Passport Main Section, Visa Main Section, Foreigners' Registration Section, the Record Section and the Archive, which hold

data/information on issued Passports, Visas, and Residence Permits.

The records maintained by all of these sections contain more or less the same type of data about an Ethiopian to whom Passport and Visa have been issued, or foreign national to whom Residence Permit or Visa have been granted.

As pointed out in the general description of the proposed system, the most important data stores that need to be held by the new system are the **Watch List**, the **Passport and Visa** and the **Resident Foreigners** files. In addition to the master file which holds data/information on resident foreigners, a new file, which does not properly exist under the current system but that must be present as one component of the proposed system, is a file which holds information on non-resident foreigners, henceforth called **Non-Resident Foreigners File**. The **Archives**, where the applicant's file containing application forms and other required documents are stored permanently will necessarily be needed by the new system.

On the other hand, since the record about an Ethiopian or a foreigner (resident and non-resident) should be held only once, the duplicate data stores maintained at the Visa Main Section, Passport Main Section and the Foreigners' Registration Section will not be logically required.

Transient data store contains data that is held for a while before being used by a process. The transient data store used by the existing system is the applicant's file, shown on the Current Physical Data Flow Diagram (Figure 2.2) just as an information flow, which moves

from one section to another for processing.

Currently, around thirty requests for Passport/Visa are batched together by the Reception Section before being passed on to either the Passport or Visa Main Sections for processing.

If the data/information about an applicant required to prepare Passport or Visa could be transmitted directly from one process into another, there would be no logical requirement for transient data store such as the one mentioned above.

3.1.2 Logical Processes and Data Flows

At general design stage, a logical process is considered as one that transforms or uses data because the system requires it to do so, independently of how it is performed (Ashworth and Goodland 1990). In order to identify and rationalize the Passport, Visa and Residence Permit processes, and the data flows that would form part of the proposed computer-based system, the following basic structured methodology rules will be applied to the processes and data flows identified (Ashworth and Goodland 1990, 108-109):

- Processes in the current system that cannot be supported by a computer should be separated from those that will be supported or replaced by the computer. This is described below;
- Processes are represented as what they accomplish independently of where they are performed or who is performing them. In other words, physical constraints dictated by the current system are removed in order to see the logical processes required by

the system to perform each task, as already done in the Current Physical Data Flow Diagram;

- Processes whose main task is to reorganize or simply passover data without transforming it in any way should be replaced by data flows carrying that information. For example, the process required to classify and distribute each request to the relevant sections for processing should be replaced by the data flow which carries the request moving to each process;
- Processes which perform exactly the same function should be combined. For example, the several validation processes performed by the Reception and by many other sections to establish the validity of the applicant's documents should be combined.
- Data flows annotated with document names should be replaced with the actual data items or groups of data items required by the relevant processes as long as they remain unchanged in the new system. For example, the applicant's file which moves from one process to another in the current Physical Data Flow Diagram should be replaced by the actual data items or group of data items used by each process.

Based on these principles of logicalization of processes and data flows, processes that will be supported and/or replaced by the computer system will mainly include:

- Creating Watch List record;
- Checking applicant's name against the Watch List File;
- Checking Ethiopian applicant's full name and/or Passport number in the Passport and Visa File before a request for Passport or Visa is processed (this is a new feature of the proposed system);

- Recording Ethiopian applicant's detail in the Passport and Visa File;
- Processing payment for Passport, Visa and Resident Permit request;
- Preparing and issuing appointment card to Ethiopian applicant;
- Retrieving applicant's record from the Passport and Visa File;
- Updating Ethiopian applicant's record in the Passport and Visa File;
- Creating, retrieving and updating, of records of foreigners living in Ethiopia in and from the Residence Permit File; and
- Creating, retrieving and updating of records of non-resident foreigners in and from the Non-Resident Foreigners File (this is additional feature of the proposed computer based system).

On the other hand, processes that will remain clerical, at least in the proposed system, as opposed to those that can be potentially automated are:

- Inspecting the validity of Identity Card and other relevant documents required from each applicant;
- Verifying the forms filled by the applicant against the documents and his/her type of request;
- Moving the Passport physically from one process into another;
- Preparing, writing and signing of the Passport;
- Preparing, writing, stamping and signing of the Residence Permit;
- Preparing, stamping and signing of the Visa on the Passport;
- Handing over of the processed Passports and Residence Permits to the respective owners; and
- Storing applicant's file in the Archive.

Since records of Passport and Visa issued to Ethiopian nationals will be maintained centrally and accessed by all the relevant processes, the functions associated with recording information on issued Passports and Visas by the Record Section will not be required. Furthermore, since record of an applicant can be updated immediately after a Passport and Visa is prepared in the Passport and Visa database, the functions associated with creating and maintaining records by the Passport and Visa processes will not be necessary.

Likewise, record about a foreigner who requests to live in Ethiopia should be kept only once when he/she applies for Residence Permit. Thus, the duplicate processes being performed by the current system to create Residence ID Book and Resident Foreigners Registration Card Index can be eliminated from the logical system. After the Residence ID is prepared, all the relevant data can be updated on the Residence Permit File. Record of non-resident foreigners can also be created and maintained in the Non-Resident Foreigners File from the Disembarkation card sent by the branch office at Bole.

The multiple checking processes performed by the existing clerical system to establish the validity of applicant's documents and his/her request should also be combined. The Logical System Data Flow Diagram should contain only one validation process, which must form part of the process of recording applicant's detail at the point where the application form filled by the applicant, and subsequently verified by the inspectors, is received. The top-level Logical System Data Flow Diagram which shows the logical processes, data flows and data stores of the potentially automatable components of the system is shown in Figure 3.1.

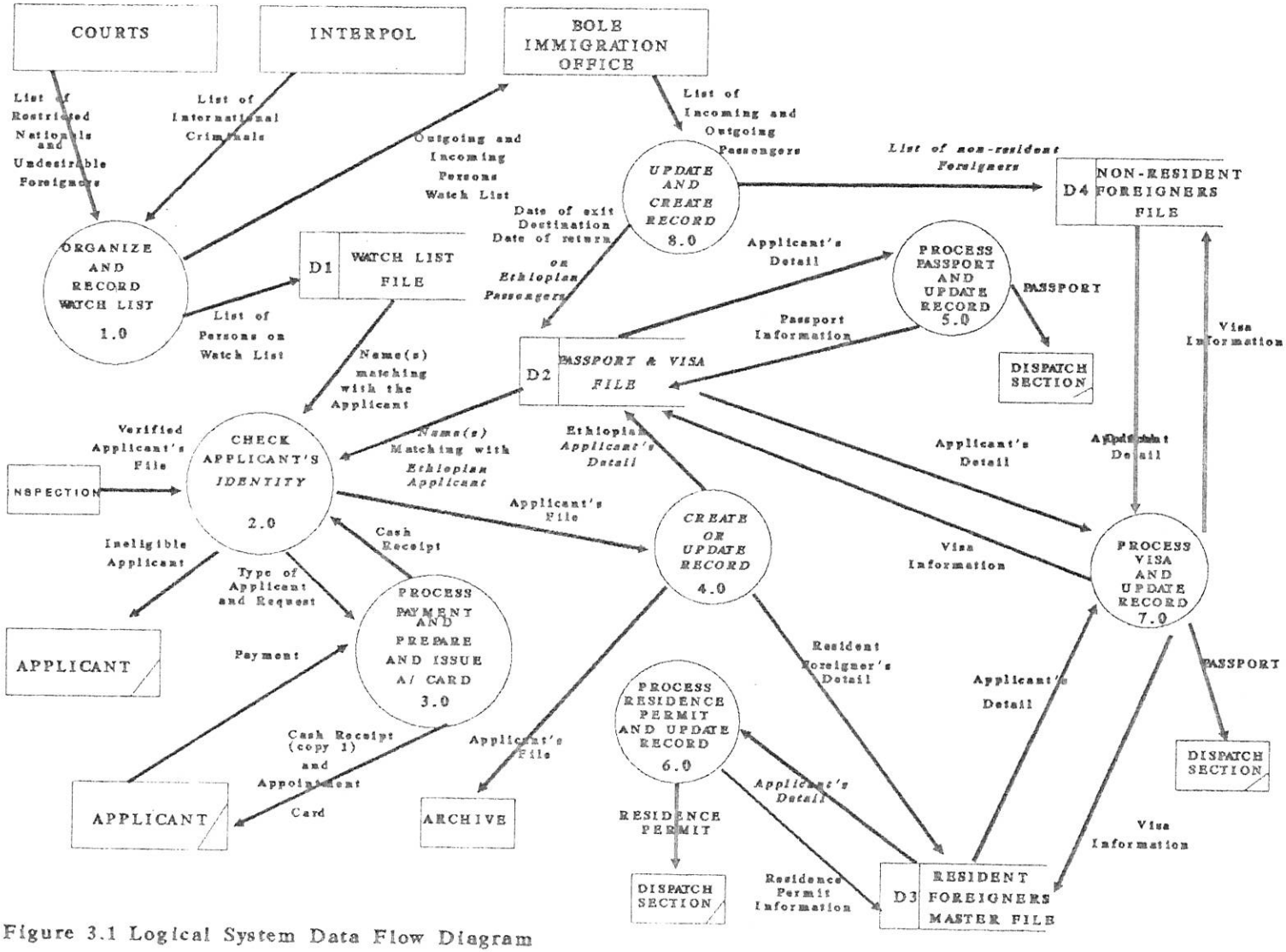


Figure 3.1 Logical System Data Flow Diagram

3.2 DESIGN ALTERNATIVES FOR THE PROPOSED SYSTEM

To design a new system, it is important to break away from the physical dictates of the current system and begin to examine possible shapes of the new system. To solve the problems and to meet the requirements of users, different ways of organizing the new system should be explored.

The best starting point to suggest different design alternatives is, again, the problems with the existing system and the requirements that the proposed computer-based immigration and consular service must meet. The major input for considering different design alternatives is the Logical System Data Flow Diagram, presented in Figure 3.1, which provides an idea of the processing requirements of the new system.

Basically, there are three major objectives that the proposed computer-based system must achieve. These are:

(1) To facilitate creation and maintenance of records of (a) persons on Watch List, (b) Ethiopians to whom Passport and Visa have been issued, and (c) resident and non-resident foreigners;

(2) To enhance access and retrieval of records maintained in the (a) Watch List, (b) Passport and Visa, (c) Residence Permit and Non-Resident Foreigners Files whenever an inquiry is made about a particular person; and

(3) Improve the system of management of records related to the Watch List, Passport, Visa, Residence Permit and Non-Resident foreigners.

To meet these requirements many design options could be developed, each varying slightly from the other. However, the three most important design alternatives, which would have a major implication on the future structure of the Department, are discussed below.

3.2.1 Decentralized System

Decentralized design option is a situation where the Department will use separate computer facilities to serve the needs of each major section. This involves automating the system of creation and maintenance of the Watch List, Passport, Visa, Residence Permit, Non-resident foreigners records, and list of incoming and outgoing passengers, where each section and major unit would be responsible for its own record.

Under this option, the Watch List, Passport, Visa and Foreigners' Registration Sections and the branch office at Bole would create and maintain records pertaining to their respective activities. This means the creation of **(a) Watch List database, (b) Passport database, (c) Visa database, (d) Residence Permit database (e) Non-resident foreigners database, and (f) List of incoming and outgoing passengers**, each located within the respective Section.

This essentially means automating the existing system with one more database added for Non-Resident Foreigners located within the Foreigners' Registration Section. The task of checking previous records on Passport would be left to the Passport Section where records on issued Passports are to be maintained.

Depending on the volume and growth rate of the records and the processing requirements of each section, this option might require one large microcomputer to act as file server and sperate terminals for each of the Passport and Visa Sections.

On the other hand, since records kept in the Watch List, Residence Permit and Non-Resident Foreigners Files are relatively small, three microcomputers with modest storage capacity might be sufficient to create, maintain and search the watch List, Residence Permit, and Non-Resident foreigners databases, respectively.

The Data Flow Diagram which shows parts of the potentially automatable processes under this design option is shown in Figure 3.2.

(a) Advantages of the Decentralized System

The following advantages may be obtained from the Decentralized design option:

- Since the databases mentioned above would be located within the relevant sections, the respective users can easily be served and obtain more rapid response to their needs;
- The databases would be less complex, user friendly, flexible and the cost of communication and data transfer may be relatively less;
- Although each database contains different information on Watch List, Passport, Visa, Residence Permit and list of Non-Resident Foreigners, the risk of complete loss of data in the event of sudden system failure or environmental catastrophe can be minimized and it may be possible for the remaining parts of the system to continue the operation; and finally

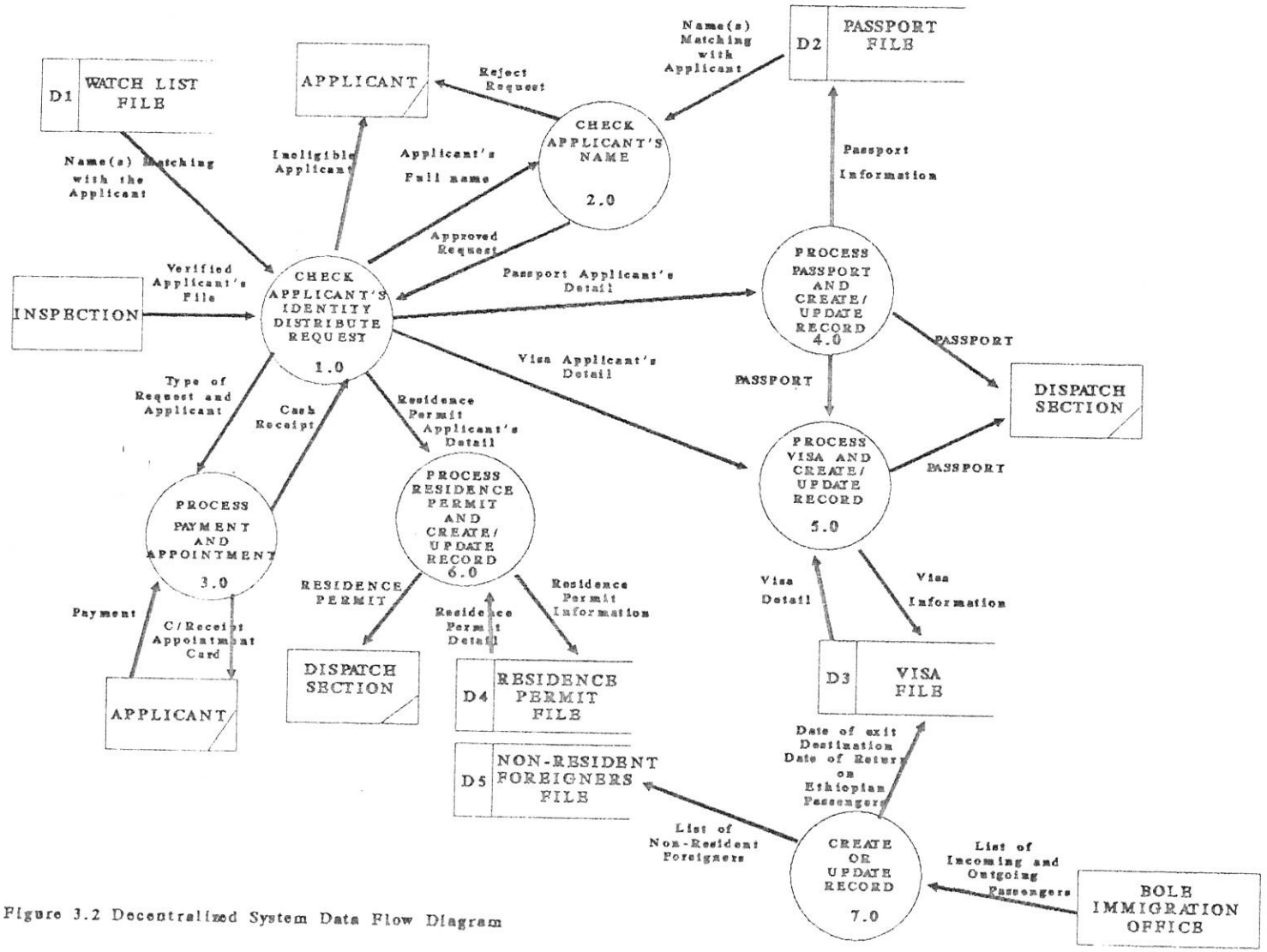


Figure 3.2 Decentralized System Data Flow Diagram

- The databases can be built up phase by phase on the basis of priority accorded to each, thereby offering flexibility in terms of finance and development.

b) Disadvantages of Decentralized System

The major disadvantage with Decentralized design option is duplication of effort in terms of hardware, software, personnel and data. Records maintained by the Passport and Visa Sections in most cases belong to the same person. If a Decentralized design option is chosen, it would require to maintain at least name and address of a person except information relating to Passport and Visa in the two the databases, which eventually leads to data redundancy. Therefore, apart from wasting resources, there is no point in maintaining records of the same person in separate databases. As a matter of fact this is one of the major problem with the existing system which initiated this study.

3.2.2 Centralized System

Centralized system is a situation where the hardware is located on one site and all the computerized organizational functions are executed by this single machine.

This means that the record of all Ethiopians to whom Passport and Visa have been issued, and record of resident and non-resident foreigners would be maintained centrally in an **Immigration Central Database** and the respective functions of the Reception, Passport, Visa, and Foreigners' Registration Sections and the task of monitoring incoming and outgoing passengers are performed centrally.

The Watch List File would also be linked to the Immigration Central Database to enable

data entry clerks at the Reception Section check the name of an applicant and then automatically search, retrieve, display and update previous records from, or enter data about new applicant into, the Immigration central database.

This design option definitely requires one or more powerful microcomputer(s) with a large storage capacity which is (are) capable of housing the Watch List, Passport and Visa, Residence Permit and Non-Resident Foreigners Files. Depending on the volume of travel transaction, request for Residence Permit and amount of data transfer, the microcomputer(s) which would serve as a file server should be capable of supporting as many workstations as may be required by the Reception, Passport, Visa and Foreigners' Registration Sections as well as the workstations located at Bole airport for data communication with the central database.

The Data Flow Diagram which shows parts of the potentially automatable processes under the Centralized design option is presented in Figure 3.3.

(a) <u>Advantages of Centralized System</u>

The following advantages may be obtained from the centralized design option:

- It greatly reduces duplication of efforts in the management of records related to Watch List, Passport, Visa, Residence Permit and Non-Resident Foreigners. It avoids the problem of data duplications in terms of consistency and accuracy, particularly, of the records maintained on Passports and Visas issued to Ethiopian nationals;

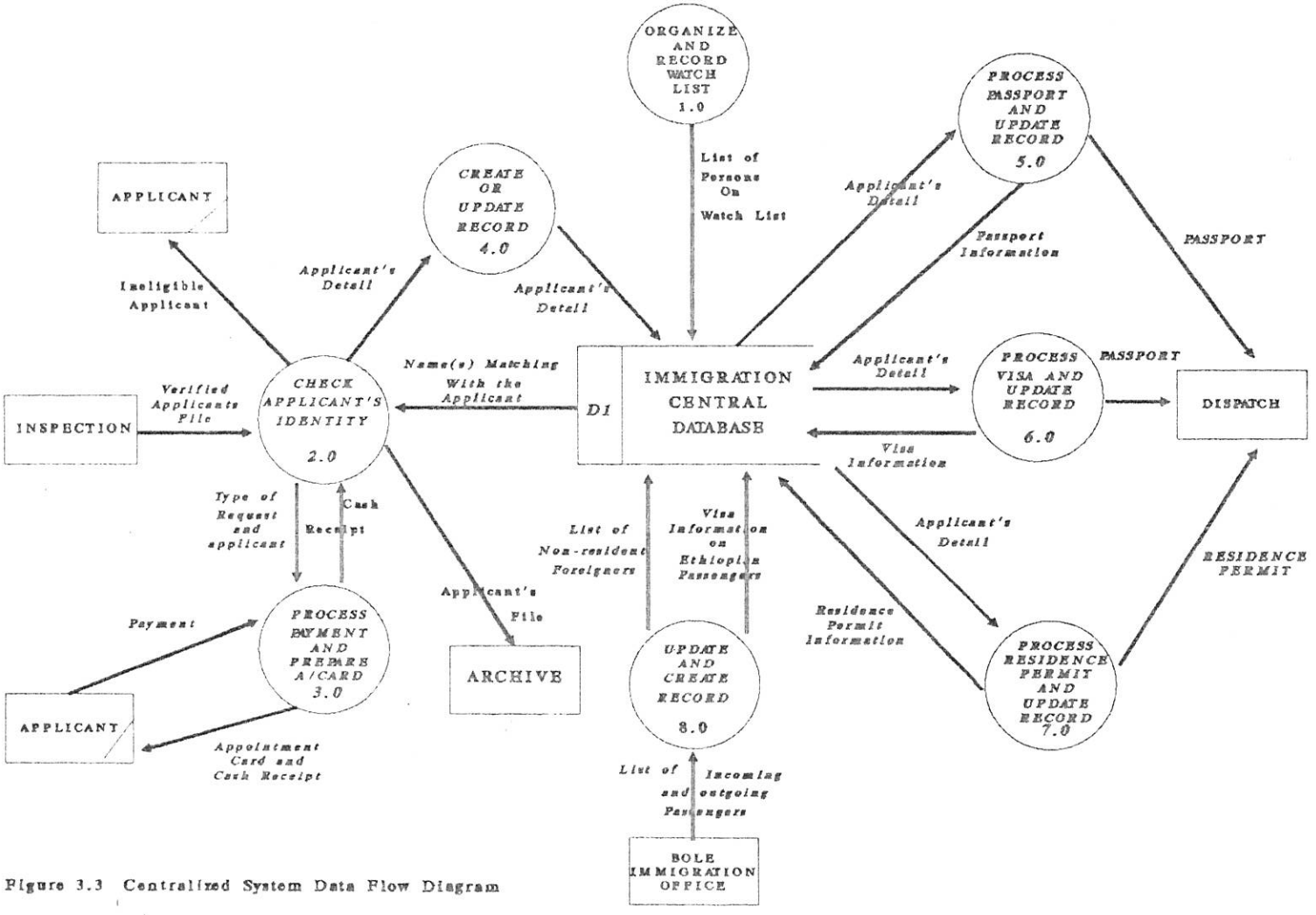


Figure 3.3 Centralized System Data Flow Diagram

- Centralized system offers security in that data can be kept under tight control and it would be much easier to exercise supervison over a single facility than the system decentralized over the Watch List, Passport, Visa and Foreigners' Registration Sections, as well as at Bole airport; and
- The choice for centralized system is often dictated by cost where a single computer can take advantage of economic of the scale and may allow some parts of the hardware which need to be shared among the different sections of the Department.

(b) Disadvantage of Centralized System

The centralized design option may have the following disadvantages:

- Since the centralized system will contain large volume of data and will require large number of application functions, the system may be too complex and large to operate; and
- Because the central database has to serve large number of terminal users at the Reception, Passport, Visa and Foreigners' Registration Sections, and the workstations at Bole simultaneously, the response time can be slow.

3.2.3 Distributed System - the recommended option

A Distributed system is a combination of Decentralized and Centralized system which to tries to capture the advantages of both while minimizing their weaknesses (Hutchinson and Sawyer 1992, 62).

Under this option, user sections will have their own computer facilities connected to a central and larger computer facility which may consist a microcomputer or a few microcomputer(s)

Normally, users should have been invited to select a design option that would specifically satisfy their needs. However, from the problem/requirement of the system and from the assessment of users needs, structure of the new system tends to favour the Distributed system.

The requirement that must be met by any proposed system clearly suggests that records of Ethiopian nationals, to whom Passport and Visa have been issued, should not be maintained in separate databases. Because, first, records which belong to one person will be replicated in two databases.

Second, the size of records to be kept at the Passport and Visa databases could be more or less of the same for both have to hold Passport and Visa data, in most cases, which belong to the *same person*.

Therefore, aside from wasting resources and duplicating data, the processing efficiency and fast response time that ought to be gained from keeping Passport and Visa information in separate databases is minimal.

On the other hand, the nature and volume of data maintained on foreigners also require that the record be kept separately from that of nationals. At present, it is estimated that around

7000 non-diplomatic foreign nationals are living in Ethiopia. This number increases, on the average, by 500 annually (this is a rough estimate obtained by deducting the number of resident foreigners leaving the country for good from the number of new residents entering to the country every year).

The number of non-resident foreigners entering into Ethiopia has also substantially increased from barely 707 in 1991/92 to 23,256 in 1993/94, and this trend is expected to persist for some time.

The Watch List File, which holds information on Ethiopian nationals whose departure must be prevented for legal reasons, should be linked to the central Passport and Visa database to allow automatic search by data entry operators. Currently, the Department maintains a list of between 4000-5000 of Ethiopian nationals against whom travel restriction is filed by different courts. An updated version of this file must also be maintained at the Bole Airport to track individuals wanted by the law enforcement authorities against whom travel restriction have been filed after they have taken Exit Visa form the Department.

The Watch List File, which contains the list of foreigners on lookout, is mainly required at entry ports, particularly at the Bole airport. The Foreigners database to be held at the head office should only contain the list of foreign nationals who have pending court cases and whose departure must be delayed until their case is settled. Therefore, instead of creating separate file at the head office for this purpose, an entry should be added into the record of such a foreigner in the Foreigners database to control his/her departure. Under this design option, the new computer-assisted system will have the following general features:

- the organizational structure of the Department will slightly change with automation of record creation and maintenance activities which are currently performed by the Passport, Visa and Foreigners' Registration Sections and maintained by the Record Section;
- records pertaining to Passports and Visas issued to Ethiopian nationals will be maintained in a central data store known as **Passport and Visa Database**;
- records of resident and non-resident foreigners will be maintained in a separate data store known as **Foreigners Database**; and
- the Reception, Passport, Visa and Foreigners' Registration Sections and the workstations at Bole airport will have terminals or microcomputers, depending on the processing need of each service center, that would enable them to access the relevant databases to discharge their respective functions.

The full set of the Distributed Systems Data Flow Diagram which incorporates the relevant feature of the Decentralized and Centralized design options is presented in Figure 3.4. Decomposition of the Recommended Systems Data Flow Diagrams follow the same procedure as what we have done in developing the Current Physical Data Flow Diagrams (Figure 2.3, 2.4, and 2.5).

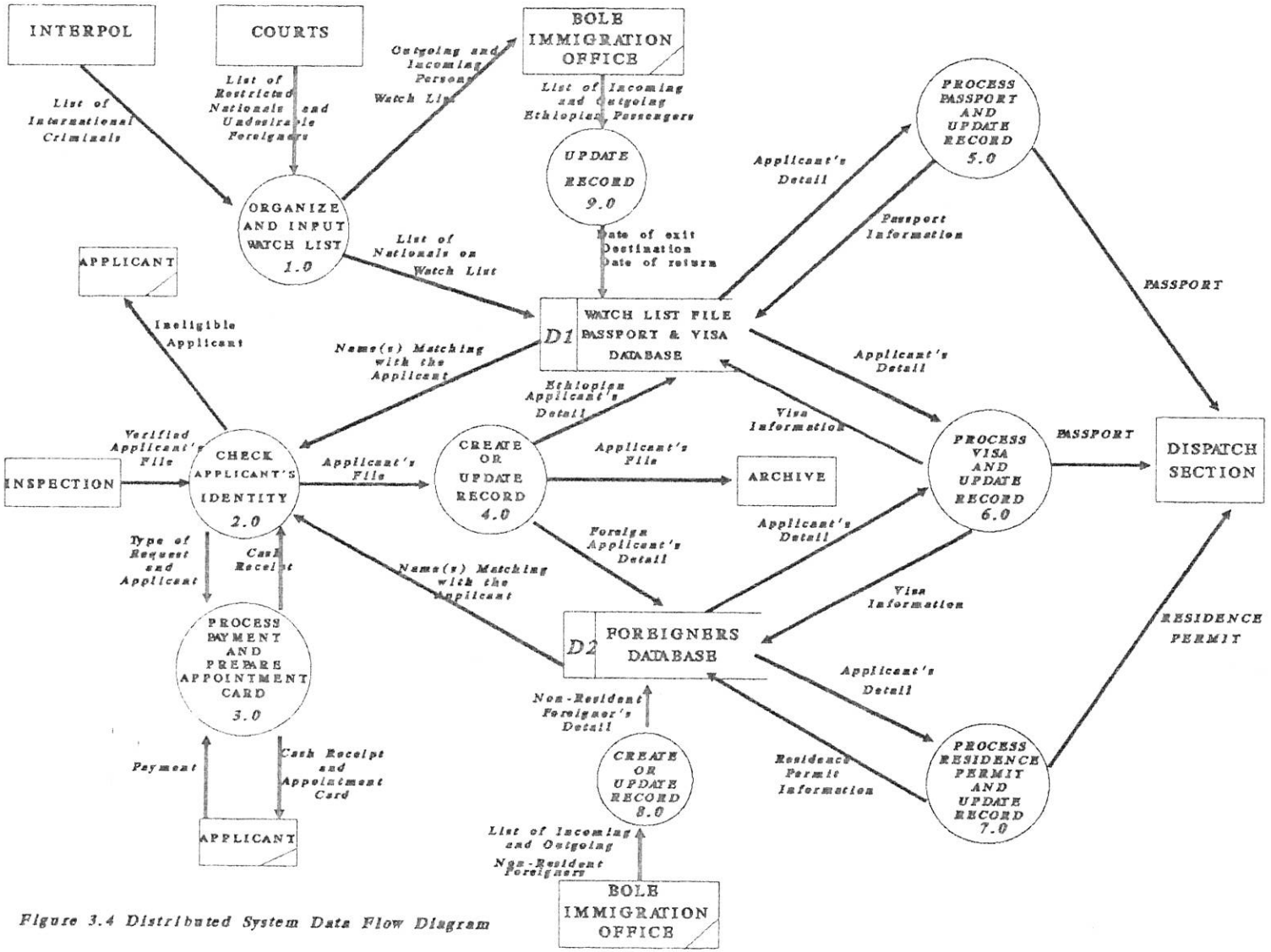


Figure 3.4 Distributed System Data Flow Diagram

3.3 REQUIREMENTS OF THE RECOMMENDED SYSTEM

3.3.1 Output/Input Requirements

Detailed description of the data content of every input to and output from the system are presented in the next two chapters. All input data items of the system are described in the relational data analysis presented in Chapter Four and design of screen lay out, paper-based input forms and some of the screen-based input and output forms are covered in the physical design stage in Chapter Five. In this section, output and input requirements of the recommended computer-assisted system are described at general level.

3.3.1.1 Output Requirments

An information system is judged by the quality of its output (Rowley 1990), and production of some output is the fundamental reason why an information system should exist. There is no point in designing and implementing an information system unless it is capable of providing some results.

From the points related to problems and requirements of the users, gathered during interview and discussion, the following output requirements are defined for the proposed computer-assisted system.

Information required on persons on Watch List

The proposed computer-assisted system is required to produce the following outputs from the Watch List File:

- Online checking of an Ethiopian applicant's name, father's name and grand father's name in the Watch List File;
- Online display of list of all persons in the Watch List File, about whom an inquiry is made, using the name, father's name or grand father's name of an Ethiopian applicant;
- Online display and hard copy list of all persons in the Watch List File, with pending restriction;
- Online display and hard copy list of all persons in the watch list file whose restriction period has ended;
- Online display and hard copy list of all persons in the Watch List File sorted by the name of the court which filed the restriction;
- Hard copy list of all individuals in the Watch List File sorted in alphabetical order; and
- Other ad-hoc queries by users

Information Required on Passport :

The proposed computer-assisted system is required to produce the following outputs from the Passport File:

- Online checking of an Ethiopian applicant's name, father's name and grand father's name in the Passport File who requests for a new Passport;
- Online display of the list of persons from the Passport file about whom an inquiry is made, using the name, father's name or grand father's name of an Ethiopian applicant requesting a new Passport;
- Online display of Personal, Passport and Visa information of an Ethiopian applicant, coming with a Passport, from the Passport and Visa Files;
- Online display of Personal and Passport information of an Ethiopian applicant requesting for a new Passport, or renewal, correction or replacement of an old Passport;
- Online display of the necessary information about a Passport and its owner;
- Online display of all Passports issued to an individual over a period of time;
- Demand-based hard copy list of all issued Passports sorted by Passport number or by alphabetical order of their owners; and
- Other ad-hoc queries by users.

Information required on Visa:

The proposed computer-assisted system is required to produce the following Visa information from the different Files:

- Online display of full name, Passport and Visa information of an Ethiopian national requesting for an Exit Visa or an extension of Exit Visa;
- Online display of full name, Passport and Visa information of a resident foreigner requesting for an Exit or Re-entry Visa;
- Online display of full name, Passport and Visa information of a non-resident foreigner requesting for an extension of Visa;
- Online display of the necessary information about a Visa and the person to whom it is issued;
- Online display of all Visas issued to a person on a given Passport, and of all Visas issued to a person on all Passports that have been issued to the person over a period of time;
- Online and hard copy printout list of all Ethiopians who departed from or returned to the country on a particular date;
- Online and printout list of Ethiopian Passport holders sorted by country of destination; and
- Other ad-hoc queries by users.

Information required on Resident Foreigners :

The proposed computer-assisted system is required to produce the following output about foreigners resident in Ethiopia from the Resident Foreigners File:

- Online display of Personal, Passport, Visa and Work Permit/License information of a resident foreigner requesting for a new Residence Permit;
- Online checking of first name, middle name and last name of a resident foreigner, in the Resident Foreigners File, about whom an inquiry is made;
- Online display of the list of persons, from the Resident Foreigners File, about whom an inquiry is made using the first name, middle name or last name of a particular foreigner;
- Online display and printout list of all resident foreigners whose permitted residence period has ended;
- Online display of the necessary information about a Residence Permit and the foreigner to whom it is granted;
- Online display and hard copy list of all resident foreigners sorted by a specified nationality;
- Hard copy list of all resident foreigners by their occupation and address in Ethiopia;
- Hard copy list of all resident foreigners sorted by Residence Permit number or by Passport number; and
- Other ad-hoc queries by users.

Information required on Non-Resident Foreigners :

The proposed computer-assisted system is required to produce the following output about non-resident foreigners from the Non-Resident Foreigners File:

- Online checking of first name, middle name and last name of a non-resident foreigner, in the Non-Resident Foreigners File, about whom an inquiry is made;
- Online display of all the necessary information about a non-resident foreigner, from the Non-Resident Foreigners File, about whom an inquiry is made using the Passport number;
- Online display and hard copy list of all non-resident foreigners sorted by a specified nationality, who arrived on the same date, and entered into Ethiopia during a given period of time;
- Online display and hard copy list of all non-resident foreigners by their address in Ethiopia;
- Online display and hard copy list of all non-resident foreigners whose permitted period of stay in the country has ended; and
- Other ad-hoc queries by users.

3.3.1.2 Input Requirments

Input requirements of the recommended computer-assisted immigration and consular system are the data items required to produce the various outputs mentioned above. This includes the data items being used by the existing and some additional data elements identified during the analysis. These are defined and analyzed in detail in the Chapter Four.

3.3.2 Processing Requirements

Based on the output requirements defined in Section 3.3.1, the basic application level processing requirements of the recommended system are as outlined below:

- As networked workstation operators at the Reception Section enter information on an Ethiopian applicant, the system should first search the Watch List File maintained in the Passport and Visa Database, and if it finds an exact match it must alert, and display a brief message to the data entry operators;
- The system should search the record of an Ethiopian applicant in the Passport File, and if it finds an exact match it should retrieve and display the record for updating. If it doesn't find an exact match, it should allow the data entry clerks to create record about the new applicant;
- As workstation operators enter data on a resident or non-resident foreign applicant, the system should access the Resident Foreigners File and Non-Resident Foreigners File maintained in the Foreigners Database, respectively, and display a message if the person about whom an enquiry is made has been found to be a person against whom a remark is made;
- The system should allow online access to users, at the Passport Section, to the Passport File maintained in the Passport and Visa Database in order to prepare a Passport requested by Ethiopian applicant and update the record of the person for whom the Passport is prepared;
- The system should allow online access to users, at the Visa Section, to the Files maintained in the databases in order to prepare Visa requested by Ethiopian nationals and resident and non-resident foreigners, and also to update the record of each

applicant for whom the Visa is prepared;

- The system should allow online access to users, at the Foreigners' Registration Section, to the Resident Foreigners File, maintained in the Foreigners Database, in order to prepare Residence Permit requested by a foreigner, and update the record of the foreigner for whom the Residence Permit is prepared;
- The system should allow online access to the workstation operators at Bole airport to update and/or create records on incoming and outgoing passengers;
- The system should allow addition, deletion, etc. of Personal information in the two databases by authorized personnel;
- The system should be capable of producing different statistical records about issued Passports and Visas, and Residence Permits, classified according to the need of users;
- The system should respond to different queries of users.

3.3.3 Security and Control Requirements

Considerable efforts are made and money is spent towards the development of computer systems and databases. Therefore, it is important that computer hardware, software and databases remain secure. It is also necessary to keep the data accurate and the files complete, and to avoid unauthorized access and use.

Since the Department maintains confidential and sensitive information about the movement of persons into and out of the country, protection against any kind of security infringement must start right form the data entry point.

Therefore, through analysis of the rules and procedures of the existing system and by consulting users, the following initial considerations of security and control requirements of the new system are outlined :

- Not every user of the system should be able to access all the files maintained in the databases. The Watch List File, for example, contains sensitive data about Ethiopian nationals whose departure from the country must be denied for legal reasons. Hence records in this file should be created, updated and accessed by authorized personnel only.
- Access rights to write and update data maintained in the Watch List File should be restricted. Data entry operators who conduct search in the Watch List File should be allowed only to read part of the file which is needed to accept or reject a particular request.
- Due to the volume of work, data entry is going to be performed by many people and the input is first recorded on Passport, Visa and Residence Permit application forms and then keyed into the system. Data entry should therefore be closely monitored and standard way of entering name of persons should be adopted throughout the system to avoid search and retrieval problems. The English language equivalents of the Amharic letters, currently being used by the computer unit, could serve as the starting point for further development of standards for the new system (see the format in Appendix C).
- It is difficult and perhaps unnecessary for the system to hold the record of all persons who have taken a Passport and Visa from the Department throughout the life time of the system for this requires unlimited storage capacity. Therefore, records which remained inactive over certain years should be transferred into history file

(number of years after which a particular record should be declared inactive will be decided by the management).

- In processing daily travel transactions the system should keep backup automatically to protect possible data losses in the event of system failure.

CHAPTER FOUR

LOGICAL DATABASE DESIGN

4.0 INTRODUCTION

To design a computer-based information system for any organization, it is necessary to know exactly what information should be held by the computer, and to specify how the information should be organized. In order to do this, it is essential to (a) identify entities of the system about which information must be held, (b) examine precisely what data items are required about each of these entities, and (c) how these data items are to be kept in the computer database.

To this end, two widely used and well-established data modelling techniques, whose main foundation is the relational data model, are discussed in this chapter. These are entity-relationship modelling and normalization, mostly used in conjunction with one another to serve as a check on the basic structure of the logical database model (Rowley 1990).

Entity-relationship approach is regarded as a top-down approach to data modelling, primarily concerned with identifying the main entities of a system and the relationships that exist between these entities. Normalization, on the other hand, is considered as a bottom-up data modelling approach, which puts more emphasis on the data on which a database is built and on the analysis of functional dependencies between the data items in order to minimize potential modification anomalies.

Hence, in the first part (Section 4.1), entities about which the Immigration and Consular Main Department maintains information and the relationships that exist between these entities are identified and analyzed.

In the second part (Section 4.2), the data items maintained about those entities are investigated and thoroughly analyzed by representing sample data item values in order to produce flexible and well-organized data items that form the basic input for the physical contents of the proposed databases.

4.1 MODELLING SYSTEM ENTITIES

4.1.1 Entities, Attribute and Relationships

4.1.1.1 Entities

In an information systems environment, an **entity** is defined as a thing, person or place of particular significance to the system about which information is held (Modell 1988). An entity type, usually called just entity, represents a whole class of things, persons or places. Entity **occurrence**, on the other hand, refers to specific thing, person or place "that can be distinguished on the basis of one data item called an identifier" (shepherd 1990). Generally, for an entity to be called an entity, the following criteria must be satisfied (Ashworth and Goodland 1990):

- an entity should have more than one attribute;

- an occurrence of one entity must be associated with at least one occurrence of another candidate entity;
- an entity must have multiple occurrences; and
- each occurrence of an entity must be uniquely identified.

Based on theses criteria, entities which are of particular significance to, and about which information is maintained by, the Department are the following :

(a) Applicant(Person);
(b) Passport;
(c) Visa;
(d) Watch List;
(e) Residence Permit;
(f) Work Permit/License; and
(g) Payment.

These represent the major entity types of the Department where each of them share common name and common descriptor. However, it may be relevant to differentiate between types of entities, such as between Ethiopian and foreign nationals, within the entity type Applicant/Person. The sub entity type foreign national can also be further subclassified into resident and non-resident foreigner. These subdivisions of entities will become relevant when we examine the relationship between the entity type Applicant/Person and the entity type Residence Permit.

4.1.1.2 Attributes

Entities are described in terms of their attributes. "An attribute is any aspect, quality, characteristics or descriptor of an entity.." (Modell 1988). For example, a Passport is

characterized in terms of its number, issue and expiry date, etc. Similarly, an Applicant is described in terms of his/her full name, nationality, date and place of birth, etc.

4.1.1.3 Relationships

A relationship is an association between two entities that is of significance to the system. An Applicant may **request** for a Passport or a Visa; a Person **possesses** a Passport; and a Passport **belongs** to an Applicant/Person. The relationship can be one-to-one, one-to-many or many-to-many. For instance, an Applicant/Person can have one and only one **valid Passport** at any given time, and a Passport belongs to one and only one Applicant/Person.

Identifying the existence of direct relationship between different occurrences of entities, which are of particular interest to the system under consideration, is the key to designing information

systems in general, and databases in particular. This is because, essential relationships between entities define access paths and entry points that enable to navigate from one entity occurrence into another in a database. These relationships are examined in greater detail in the following section.

4.1.2 Entity-Relationship Model

Entity-relationship model is one of the most popular modelling technique employed by entity relationship approach to analyze and design complex set of relationships between system entities.

To determine and establish a relationship between pairs of entities, it is important to examine if:

- there are occurrences of entity, say Passport, which are **directly** related to occurrences of another entity, say Applicant/Person; and
- that direct relationship is of **interest** to the Department. In some cases there may be a direct relationship between two entities but one which is not relevant for the system to conduct its day-to-day activities. For example, there may exist a direct relationship between different occurrences of Ethiopian nationals about whom the Department maintains Passport and Visa information. But this relationship is not important for the purpose of processing and maintaining Passport and Visa information. This is to mean that the Department is not interested in knowing whether one Ethiopian Passport holder is related to another in one way or another.

Once the existence of direct and important relationship between two entities is identified, the degree of this relationship must be further examined. To determine the degree of relationship between two entities, it is essential to ask if, for example, **one occurrence** of the entity Passport can be related to **more than one occurrence** of the entity Applicant/Person and if one occurrence of the entity Applicant/Person can be related to

more than one occurrence of the entity Passport. The outcome of this investigation provides whether the relationship type between two entities is one-to-one, one-to-many or many-to-many.

In addition to the degree of relationship, it is also important to examine the membership class of each participating entity. Membership class between two entities can be **obligatory** or **non-obligatory (optional)**. A relationship is said to be obligatory if, for example, an occurrence of the entity Passport doesn't exist without a related occurrence of the entity Applicant. On the other hand, a relationship is said to be non-obligatory or optional if, for example, an occurrence of the entity Passport exists without a related occurrence of the entity Visa.

If membership is obligatory, then an entity occurrence may not be recorded unless its relationship occurrence is recorded at the same time. On the other hand, if membership is not obligatory, the entity occurrence may be recorded without the occurrence of its relationship. Based on this, direct and relevant relationships that exist between entities of the Department and degree and membership class of each entity participating in the relationship are identified and analyzed below. The semantics of these relationships have been discovered by analyzing the Department's rules, constraints and statements on each of the entities, attributes and their domains.

Applicant/Person and Passport Relationship: The relationship which exists between an Applicant/Person and a Passport is direct and important to the Department. An Ethiopian or foreign national, about whom information is maintained by the Department should have

a Passport, and a given Passport should belongs to its respective owner. The Department's prime concern revolves around manipulating data about a Passport which belongs to a particular Person, and keeping records about a Person to whom a Passport has been issued by the Department or any person with a valid Passport to whom a Visa has been issued by the Department.

As to the degree of the relationship between these two entities, one occurrence of an Applicant can be related to more than occurrence of a Passport, but one occurrence of Passport cannot be related to more than one occurrence of an Applicant.

According to the Ethiopian law (and this is true to many other countries), an Ethiopian is allowed to possess one valid Passport at a particular time. But a Person can have many Passports issued to him by the Department, Ministry of Foreign Affairs or by a similar body/department of a foreign country (if the applicant is a foreigner) over a period of time. This means that the type of relationship between an Applicant and a Passport is one-to-many.

With regard to the membership class of these two entities, an occurrence of an Applicant/Person cannot exist without a related occurrence of a Passport since any Person without a Passport is of no particular interest to the Department. Similarly, an occurrence of a Passport cannot also exist without a related occurrence of an Applicant. Because, a Passport cannot be prepared or information pertaining to it cannot be maintained by the Department without the existence of its corresponding owner. This shows that the relationship between an occurrence of an Applicant/Person and an occurrence of a Passport

is obligatory in that an occurrence of one entity cannot be recorded unless its relationship occurrence is recorded at the same time.

Applicant and Visa Relationship: The relationship, which exists between an occurrence of an Applicant/Person and an occurrence of a Visa, is the same as the type of relationship which exists between an Applicant/Person and a Passport-direct and important relationship to the Department. An Applicant/Person may have one valid Visa at a particular time which only belongs to him/her, but several Visas can be issued to that Applicant/Person over a period of time.

However, unlike the relationship which exists between an Applicant/ Person and a Passport, an occurrence of the entity Applicant can exist without an occurrence of the entity Visa. That is, an Ethiopian national can take Passport without Visa from the Department. This means that the relationship between Applicant/ Person and Visa is non-obligatory one-to-many type of relationship from Applicant/Person to Visa. But it is obligatory form Visa to Applicant, since a Visa cannot be prepared or information pertaining to it cannot be maintained by the Department without its relationship occurrence, that is, its corresponding owner.

Passport and Visa Relationship: There is a direct relationship between an occurrence of a Passport and occurrence of Visa which is of interest to the Department. Because, access path is required to determine which Visa is issued to an Applicant/Person, on which Passport, and how many Visas are issued to an Applicant/Person on a given Passport and/or on all Passports.

Failure to identify the relationship that exists between these two entities could lead to the loss of this important information. This kind of problem is what Howe (1982) identified as the 'fan trap' and the 'chasm trap' which occur when an entity, i.e. an Applicant, has one-to-many relationship with two other entities, in this case the Passport and Visa.

The type of relationship which exists between these two entities is one-to-many, since many Visas can be issued on a single Passport at different time. The membership class from Passport to Visa is an optional one, for the fact that an occurrence of the entity Passport can exist without a related occurrence of the entity Visa. But the membership class from Visa to Passport is obligatory, since a Visa cannot be issued or information relating to it cannot be maintained by the Department about an Applicant/Person who is not in possession of a valid Passport.

Applicant and Residence Permit Relationship: If the generic entity type Applicant/Person is used to refer to both Ethiopian and foreign Applicants (as what we have been doing so far), it may lead us to think that the relationship which exists between an occurrence of the entity Applicant/Person and an occurrence of the entity Residence Permit is non-obligatory. Because, an Ethiopian national about whom the Department maintains Personal, Passport or Visa information, in no way, is required to hold Residence Permit.

This, however, may lead to a serious mistake. Any foreigner covered by Proclamation 271/69 who wishes to reside in Ethiopia must hold a Residence Permit. Therefore, the relationship that exists between the entities is obligatory from both sides in that the occurrence of one cannot be recorded without an occurrence of the other. Hence, more

specific sub entity name, 'resident foreign Applicant', is used to qualify the entity type Applicant/ Person in order to accurately identify the relationship which exists between a resident foreigner and Residence Permit.

This relationship is direct and of particular interest to the Department. Although a resident foreigner is required to have only one valid Residence Permit at a particular time, the degree of relationship which exists between these entities is one-to-many. Because, it is possible for a resident foreigner to take several Residence Permits during his/her stay in Ethiopia over a number of years, which all belong to him/her. An occurrence of the entity Residence Permit cannot, however, be related to more than one occurrence of the other entity.

Residence Permit and Work Permit or License Relationship: There is a direct relationship between Residence Permit and Work Permit/ License which is of particular interest to the system. The relationship is obligatory from both sides of the entities, since the Department issues Residence Permit to a foreigner who comes up with valid Work Permit/License (or valid reason for residence inside the country, such as dependants of a resident foreigner) from relevant Government Ministries. Therefore, an occurrence of the entity Residence Permit cannot exist without a related occurrence of the entity Work Permit/License and an occurrence of the entity Work Permit cannot exist without a related occurrence of the entity Residence Permit.

Applicant and Payment Relationship: A particular occurrence of applicant makes a payment for a Passport, Visa or Residence Permit, depending on the type of applicant and the nature

of his request. A cash receipt is prepared by the Department and issued to the applicant. Between these two entities access path is required to determine which applicant has made a payment for what kind of request and which payment belongs to which applicant.

The relationship between Applicant and Payment is a one-to-many from Applicant to payment, because an applicant can make several Payments for Passport, Visa or Residence Permit over a period of time, and no one Payment can belong to two or more Applicants. Membership class of the two entities is obligatory from both sides of the entities. On the other hand, relationships which exist between Payment and Passport, Payment and Visa or Payment and Residence Permit, are one-to-one since the occurrence of these entities are the very reasons for the Payment effected by the Applicant.

Applicant and Watch List Relationship: There may exist a direct relationship between an Applicant and a black listed person in the Watch List, which is of particular interest to the Department. One occurrence of an Applicant may be related to one occurrence of a person in the Watch List, and one occurrence of a person in the Watch List may be related to only one occurrence of the entity Applicant. Therefore, the relationship which may exist between an Applicant and a person in the Watch List is non-obligatory or optional one-to-one relation from both the sides of the entities. This is because, an occurrence of the entity Applicant can be recorded without a corresponding record of the person in the Watch List. At the same time, an occurrence of a black listed person can be recorded by the Department without the person to which it relates. The Department is only interested in those black listed persons who apply for Passport, Visa or Residence Permit and in those persons who are on lookout after they have taken a Passport and Visa from the Department.

The Data Structure Diagram (DSD), which shows the entities and their relationships, is presented in Figure 4.1.

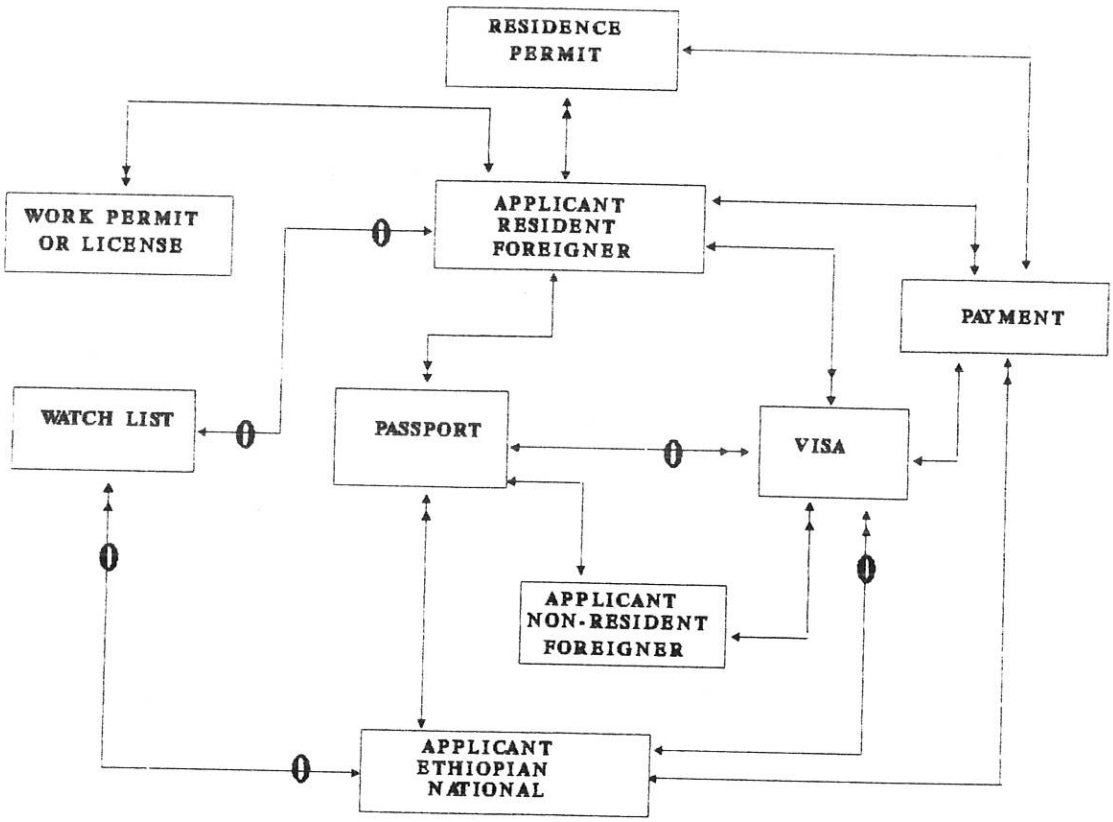


Figure 4.1 Data Structure Diagram

- Single arrowhead in both directions indicates a one-to-one relationships.
- Single arrowhead in one direction and a double one in the other represents one-to-many relationships.
- The circle at one of the ends of the line on the diagram shows the relationship is non-obligatory or optional.
- Two circles at both ends show that the relationship is non- obligatory or optional for both entities.

4.2 MODELLING SYSTEM DATA

4.2.1 Relational Data Analysis- an overview

While describing entity-relationship model (Section 4.1), an attempt has been made only to examine the relationships which exist between entities of the Department. Our effort in developing the entity-relationship model was limited to identifying the entities and their relationships. However, prior to physical database design it is useful to prepare complete and detailed logical data design based on analysis of data items and their interrelationships. This approach to data modelling is known as relational data analysis, where the pioneering work in this theory was introduced by E.F. Codd in the early 1970s.

The main objective of relational data analysis is to organize all of the system's data items into a set of well-normalized records so that unwanted redundancies are removed, thereby avoiding update anomalies such as problems associated with modifying, inserting and deleting of records maintained in a database.

4.2.2 Normalization of System Data Items

In order to achieve a well-defined model of data for the database design, input and output data items of the Department have to pass through certain stages of normalization known as **normal forms**. Although there are five stages of normal forms, the fourth and fifth steps are used to remove, if any, two or more multivalued facts about an entity (many-to-many

relationship) and are rarely used in practice (Davis and Olson 1985).

However, it should be noted that the main goal of normalization is not just to arrive at Third, Forth or Fifth Normal Forms, but to create a fully normalized state of data in which the same fact will never accidentally be stored more than once (Parkin 1987).

This being the main objective of normalization, in order to rigorously analyze data items of the system and their interrelationships, all sources of data are covered as much as possible for the success of normalization greatly depends on the sources used for the analysis.

Therefore, the sources used for the data analysis discussed below were collected from the following cards, forms and files:

(a) The application forms (shown in appendix A, Forms 1-7);

(b) Passport and Visa record cards and files, Residence Permit card and Master file (discussed in section 2.1.3);

(c) Passport; and

(d) Residence Id.

The data collected about the entities, attributes and relationships from these forms and files are documented in the data dictionary presented in Table 4.1. The data dictionary contains definitions, type, and size of all the data stored by the system.

Table 4.1
DATA DICTIONARY

DATA ITEM IDENTIFIER	DATA ITEM NAME	DATA ITEM DEFINITION OR DESCRIPTION	TYPE	RANGE OF VALUES	SIZE
AP	Applicant	A person of Ethiopian national, Resident or Non-Resident foreigner travelling into and out of the country and about whom the Department maintains Personal, Passport, Visa and Residence Permit record			
AP-FLNO	File Number	A unique file number under which record of an applicant is maintained by the Department	AN		10
AP-GNNM	Given Name	Name of an Ethiopian applicant	A		20
AP-FTNM	Father's Name	Father's name of an applicant of Ethiopian nationality	A		20
AP-GFNM	Grand Father's name	Grand Father's name of an applicant of Ethiopian nationality	A		20
AP-FFNM	First Name	First name of an applicant of foreign nationality exactly as in his/her Passport	A		20
AP-FMNM	Middle Name	Middle name of an applicant of foreign nationality exactly as in his/her Passport	A		20
AP-FLNM	Last Name	Last name of an applicant of foreign nationality as in his/her Passport	A		20
AP-NTON	Nationality	Nationality of an applicant	A		10
AP-NTBB	Nationality by Birth	Nationality by birth of a resident foreigner	A		10
AP-BPLC	Birth Place	Place of birth of an applicant	A		15
AP-BRDT	Birth Date	Date of birth of an applicant	N	DDMM YYYY	10
AP-DMCL	Country of Residence	The country where the applicant lives most of the time (Domicile is also used)	A		10
AP-REGN	Region	Name of the region where the applicant lives within Ethiopia	AN		10
AP-TOWN	Town	Name of the town where the applicant lives within the region	A		15
AP-WRDA	'Worada'	Name of the 'Worada' where the applicant lives within the town	AN		15

AP-KEBL	'Kebele'	Name of the 'Kebele' where the applicant lives within the 'Worada'	N		02
AP-HONO	House/Flat Number	Identifying number of the house/flat number where the applicant lives within the 'Kebele'	N		05
AP-RETL	Residence telephone Number	Telephone number of the applicant at his/her permanent residence address	N		12
AP-SEX	Sex	Gender of the Applicant	A	F	01
AP-IDNO	ID Card Number	Personal Id card number of an applicant of Ethiopian nationality as recorded on the identity document issued to him/her by his/her employer or the 'Kebele' where he dwells in	AN		12
AP-IDIS	ID issued by	Name of the employer or the 'Kebele' that issued the Id card to an applicant of Ethiopian nationality	A		25
AP-HGHT	Height	Height of an applicant	N	Cm	03
AP-EYCL	Eye colour	Eye colour of an applicant	A		08
AP-HRCL	Hair colour	Eye colour of an applicant	A		08
AP-SPMK	Special mark	Special identifying mark of the applicant	A		10
RQ-RQTP	Type of Request	Type of Travel Document, Visa or Residence Permit requested by the applicant	A		15
RQ-RQDT	Date of Request	Date on which an application form was filled by an applicant requesting Travel Document, Visa or Residence Permit	N	DDMM YYYY	10
RQ-RONM	Reception officer	Name of the reception officer in the Department who approves request of the applicant	A		20
RQ-RONO	Code of Reception officer	Code/Number of the reception officer	AN		06
RQ-CSRN	Cash receipt number	Cash receipt prepared by the Department for a payment effected by the applicant	AN		10
RQ-CSRE	Cash amount received	Cash received from the applicant for	N		07
PS-PSNO	Passport Number	Number of a valid Passport issued by the Department, Ministry of Foreign Affairs or any foreign country	AN		10
PS-ISDT	Passport Issue Date	Date on which the Passport was issued	N	DDMM YYYY	10
PS-EXDT	Passport Expiry Date	Date on which the Passport expires	N	DDMM YYYY	10
PS-ISBY	Passport Issued by	Authority that issued the Passport	A		30
PS-ISPL	Passport issue place	The location of issue of the Passport	A		20

PS-STAT	Status of Passport	Current status of the Passport issued by the Department	A	a=activ e v=void l=lost w=with drawn	01
PS-STDT	Passport status date	Date on which a status is assigned to the Passport	AN	DDMM YYYY	10
PS-RMRK	Passport Remark	Any information to be included in the Passport issued by the Department	A		40
PS-WRNM	Name of Passport writer	Name of the Passport writer issued by the Department	A		20
PS-WRNO	Code of Passport writer	Code/number of the Passport writer in the Department	AN		06
PS-CHNM	Name of child	Name of the child under 5 uears old travelling on the same Passport issued by the Department	A		15
PS-CHBD	Birth date of Child	Date of birth of the child under 5 years old travelling on the same Passport issued by the Department	A	DDMM YYYY	10
PS-CHNT	Nationality of child	Nationality of the child under 5 years old travelling on the same Passport issued by the Department	A		10
PS-CHNO	Number of children	Number of children travelling on the same Passport with a foreigner entering to or departing from Ethiopia	N		01
VS-ENVS	Entry Visa	Type of Visa issued to a foreigner entering to Ethiopia by the Ethiopian government diplomatic and Consular missions abroad or by the Department at ports of entry	A	Entry Visa Busines s Visa Tourist Visa Transit Visa	15
VS-EXVS	Exit Visa	Type of Exit Visa issued by the Department to an Ethiopian or foreign national departing from Ethiopia	A	Multipl e Visa Single Visa Re-entry Visa	15
VS-VSNO	Visa number	Visa number of a travller entering or leaving Ethiopia	AN		07
VS-VSID	Date Visa issued	Date on which the Visa was issued	N	DDMM YYYY	10
VS-VSED	Date Visa expires	Date on which the Visa expires	N	DDMM YYYY	06
VS-VSIP	Place of Visa issue	The location of issue of the Visa	A		10
VS-RGNM	Visa registrar	Name of the Visa registrar in the Department	A		20
VS-RGNO	Code of Visa registrar	Code or number of the Visa registrar in the Department	AN		06

VS-DEST	Destination	Destination city/country of the traveller to whom Exit or Re-entry Visa has been issued by the Department	A		10
VS-ENDT	Date of entry	The date on which a foreigner entered into Ethiopia	N	DDMM YYYY	10
VS-RTDT	Date of return	Date on which an Ethiopian or a resident foreigner returned to Ethiopia	N	DDMM YYYY	10
VS-PUTR	Purpose of travel abroad	The purpose for which the person to whom Visa is issued by the Department is travelling outside Ethiopia	A		10
VS-EXDT	Date of Exit	The date on which a traveller left Ethiopia	N	DDMM YYYY	06
RP-RPNO	Residence Permit number	Number of the Residence Permit given by the Department to a resident foreigner	AN		07
RP-ISDT	Date Residence permit issued	Date on which a Residence Permit is issued by the Department to the resident foreigner	N	DDMM YYYY	10
RP-EXDT	Date Residence Permit expires	Date on which the Residence Permit expires	N	DDMM YYYY	10
AP-POCP	Previous occupation	Previous occupation of a resident foreigner before coming to Ethiopia	A		20
WP-WPNO	Work Permit/ License number	Work Permit or License number of a resident foreigner	AN		07
WP-ISBY	Work Permit/ license issued by	Government Department that issued the Work Permit or License to a resident foreigner	A		35
WP-EBNM	Employer/ Business name	Employer or name of the business organization for which a resident foreigner works in Ethiopia	A		40
WP-OFTL	Office telephone number	Office/ work place telephone number of a resident foreigner	N		08
RP-SPFL	Spouse file number	File number of the husband or wife of a resident foreigner	AN		07
RP-SPNM	Name of spouse	Name of the husband or wife of a resident foreigner	A		20
RP-SPNT	Nationality of spouse	Nationality of the husband or wife of a resident foreigner	A		10
RP-SPBT	Birth date of spouse	Birth date of the husband or wife of a resident foreigner	N	DDMM YYYY	10
RP-SPOC	Occupation of spouse	Occupation of the husband or wife of aresident foreigner	A		15
RP-NDNR	Name of dependant without R.P	Name of dependant under 19 years old living with a resident foreigner without own Residence Permit	A		20

RP-BDNR	Birth date of dependant without R.P	Birth date of dependant under 19 years old living with the resident foreigner without own Residence Permit	N	DDMM YYYY	10
RP-SDNR	Sex of dependant without R.P	Sex of the dependant under 19 years old living with a resident foreigner without own Residence Permit	A	M or F	01
RP-DRFL	File number of dependant with R.P	File number of a dependant over 18 years old living with the resident foreigner with own Residence Permit	AN		07
RP-DRNM	Name of dependant with R.P	Name of a dependant over 18 years old living with the resident foreigner with own Residence Permit	A		20
RP-DRNT	Nationality of dependant with R.P.	Nationality of a dependant over 18 years old living with the resident foreigner with own Residence Permit	A		10
RE-RENO	Restriction reference number	Reference number under which travel restriction is filed against a person by a court of competent jurisdiction	AN		07
RE-RQBY	Restriction requested by	Name of a court which filed the travel restriction against a person	A		25
RE-RQDT	Date restriction requested	Date on which the travel restriction is filed against a person	N	DDMM YYYY	10
RE-EXDT	Date restriction expires	Date on which the travel restriction filed against a person expires	N	DDMM YYYY	10
RE-RSON	Reason for restriction	Reason for the restriction filed against a person	A		35

A = alphabetic N= numeric AN = alphnumeric

4.2.2.1 Record of Ethiopian Nationals

To normalize the data items that should form Personal, Passport and Visa records of Ethiopian nationals in the computer database, the data collected from Passport and Visa input and output forms are further segregated. For example, the data item 'Nationality' which appears on an Ethiopian Passport is the same for all occurrences of the entity Passport, since Ethiopian Passport is given only to an Ethiopian national. Therefore, there is no need to maintain the data item 'Nationality' in the Passport and Visa Database which only contains the record of Ethiopian nationals. For a Passport issued by the Immigration and Consular Main Department, the data item 'Passport issued by ' holds the same value, i.e. the Ministry of Internal Affairs, for all occurrences of the entity Passport. However, since Diplomatic and Special Passports are prepared and issued to nationals by the Ministry of Foreign Affairs, the data item 'Passport issued by' cannot hold a default value whenever a Visa is issued by the Department to an Applicant who holds Diplomatic or Special Passport.

To ensure consistent use of data item names for the analysis, the names and associated data descriptions held in the data dictionary are used. The analysis is presented below:

(a) Unnormalized form (UNF)

The first step in relational data analysis is to represent the data items in unnormalized form (UNF) and then to pick a primary key that uniquely differentiates the record of one

Applicant from any others. Normally, to visualize the process of normalization, tables (relations) which comprise both actual data occurrences and the heading data items at the top of the table are used. However, since the data grouped together for the analysis are too many and would involve manipulating large table, a simplified approach is used.

On the other hand, since the system maintains records related to issued Passports, Visas and Residence Permits, the analysis is based on the data items that evolve **after** a request has been processed and a Passport, Visa or Residence Permit is prepared and issued. Analysis of the data items in the request prior to confirmation cannot yield complete information. The data items that would appear as a column heading on a table (relation) are listed down in Table 4.2.

Table 4.2

UNNORMALIZED FORM OF PERSONAL, PASSPORT, VISA AND PAYMENT DATA MAINTAINED ABOUT ETHIOPIAN NATIONALS

PERSONAL DATA
- File number
- Personal name
- Father's name
- Grand Father's name
- Occupation
- Birth date
- Birth place
- Height
- Eye colour
- Hair colour
- Special mark
- Domicile
- Region
- Town
- Worada
- Kebele
- House number
- Residence Tele number
- Id Card number
- Id Card issued by

PASSPORT DATA
- Passport number
- Passport issue date
- Passport Expiry date
- Passport Issued by
- Passport Issue place
- Passport Status
- Passport Status date
- Passport Remark
- Name of Child
- Birth Date of Child
- Nationality of child

VISA DATA
- Visa number
- Visa issue date
- Visa expiry date
- Visa issue place
- Destination
- Purpose of travel
- Date of exit
- Date of Return

PAYMENT DATA
- Cash receipt number
- Amount received

If the data items listed above were represented horizontally, in which each column head (data item name) comprising an actual data occurrences, each row (commonly referred to as tuple) ought to be uniquely identified by the primary key. In some cases, this may require a combination of all the values in the tuple to identify it. But in most cases, one value or a combination of two or three values is sufficient to uniquely identify each row.

For the data items presented above the File number, assigned at the time when the first Passport is issued to an Applicant, is the primary key that uniquely identifies a particular occurrence of an Ethiopian Applicant from all others. Because no two occurrences of Applicants can have the same value of the File number. In addition to the file number, the Passport number, which is unique to each applicant, can also serve as a candidate or alternate key to identify the occurrence of a particular Applicant's record. Aside from the uniqueness requirement, for any data item to serve as a candidate key, it must possess the following qualities (Shepherd 1990):

-time invariant uniqueness in that over time no two records will ever have the same value for the chosen primary field; and

-parsimonious, meaning that the candidate key should be as short as possible.

The Passport number satisfies these two conditions. Although different Passports consisting of different numbers are issued to an Applicant over a period of time, they are not the same and can uniquely identify its owner.

A problem in using the File number or the Passport number as a search key arises when users want to find out whether an Applicant who requests a new Passport has not taken a

Passport from the Department some time before. In this case, Name, Father's name and Grand Father's name of the applicant should be used to retrieve and display any matching record(s) from the database.

(b) First Normal Form (FNF)

The main purpose of the First Normal Form is to remove any group of repeating data items from the original unnormalized relation into separate table to form new relations with new keys identified for the new relations. A repeating group is defined as "a table which has null values in the identifier column of some rows (tuples) or, to take an alternative view, a table which has multiple values for one attribute of a single occurrence of the entity" (Parkin 1987 ,108). The basic principle of First Normal Form is that only one value should be associated with each row/column intersection in the table.

To identify and separate repeating data items groups, if any, let us examine each group relating to Personal, Passport, Visa and Payment data shown in Table 4.2.

When we Look into the unnormalized data relation, we find that all the data items associated with Personal information do not repeat. This means that, a particular occurrence of an Applicant cannot have more than one values of the data items which describe his/her identity, such as full name, date and place of birth, occupation, address, height, eye colour, hair colour, etc. at any time.

The remaining data items associated with Passport, Visa and payment can occur with multiple values for a single value of the Applicant's file number.

To visualize how these would appear in reality let us see the situation by representing hypothetical values for each of the data item groups described above.

File Number 16892 Personal name Bekele
Father's name Kebede G/Father's name Hailu

PASSPORT

File number	Passport number	Passport issue date	Passport Expiry date	Passport Status	Passport issued by	at
16892	E-00175	30-12-74	30-12-76	Void	A.A	MIA
	E-09125	25-02-77	25-02-79	Lost	A.A	MIA
	E-12175	20-07-78	20-07-80	Active	A.A	MIA

VISA
File no. 16892

Passport Number	Visa Number	Visa Issue/D	Visa Expiry/D	Visa Iss/at	Destinat	Date Exit	Date Return
E-00175	3265/75	05-01-75	05-02-75	A.A	ROME	----	-----
	4135/75	03-06-75	03-09-75	A.A	DUBAI	----	-----
E-12175	2578/80	10-02-80	10-03-80	A.A	PARIS	----	------

PAYMENT

File number	Cash receipt number	Amount Received	Type of Request
16892	No. 38178/74	200	Passport
	No. 40564/75	65	Single Visa
	No. 88678/75	300	Multiple Visa
	No. 90000/77	200	Passport
	No. 11000/78	240	Passport (reple.)
	No. 78000/80	65	Single Visa

These repeating data item groups should be removed into a separate relation. Once the repeating items are removed, a primary key for the new relations should be identified. The key for the new relation is a combination of the key identified in the parent relation and one or more additional data items that can uniquely identify the new relation.

File number is, therefore, the parent identifier and further examination shows that :-

- for the data items associated with PASSPORT, the **Passport number** can uniquely identify a particular occurrence of a Passport. As described earlier, since only one Passport number is given to one person at a time, it can also serve as a candidate key. Therefore, the new Passport relation has a compound key of the parent identifier File number and Passport Number that uniquely identifies each tuple in the new Passport relation.
- for the data item groups associated with VISA, the **Visa number** can uniquely identify each row. Furthermore, an occurrence of a Visa number is always associated with a given value of a Passport number. Because one Visa number cannot be assigned to more than one Passports. Therefore, the compound key of the new relation is the File number, the Passport number and Visa number.
- for the data items associated with PAYMENT, the **cash receipt number** with the file number can uniquely identify a payment made by a particular Applicant at any time. Because, one cash receipt with a unique serial number is prepared to process one type of payment at any time. Therefore, the compound key of the new relation is the File number and the Cash receipt number.

With the repeating data item groups removed, the First Normal Form of the new data relations is presented in Table 4.3 with the primary keys underlined.

Table 4.3

FIRST NORMAL FORM OF PERSONAL, PASSPORT, VISA AND PAYMENT DATA MAINTAINED ON ETHIOPIAN NATIONALS

PERSONAL DATA RELATION		
File number	Region	Height
Personal name	Town	Eye colour
Father's name	Worada	Hair colour
Grand Father's name	Kebele	Special mark
Occupation	House number	
Birth date	Tele. number	
Birth place	Id card number	
Domicile	Id card issued by	

(a)

PASSPORT DATA RELATION
File number
Passport number
Passport issue date
Passport expiry date
Passport issued by
Passport issue place
Passport status
Passport Status date
Passport remark
Name of child
Birth date of child
Nationality of child

(b)

VISA DATA RELATION
File number
Passport number
Visa number
Visa issue date
Visa expiry date
Visa issue place
Destination
Purpose of travel
Date of exit
Date of return

(c)

PAYMENT DATA RELATION
File number
Cash receipt number
Amount received

(d)

(c) Second Normal Form (SNF)

The purpose of the Second Normal Form is to remove all nonkey data items that depend on a subset of the key field into separate relations (Davis and Olson 1985). The test of Second Normal Form affects only relations that have compound keys, and its objective is to ensure that no nonkey data item is a fact about a subset of the key. The test involves whether any nonkey data item in a compound key relation is dependent on only part of that compound key. This concept of dependency is often referred to as functional dependency.

Let us now subject each of the new relations, with a compound key as an identifier, to the test of Second Normal Form.

PASSPORT RELATION

> Does each of the data items in the Passport relation depend on the whole key? Or do any of the items in the relation identified by the Applicant File number with the Passport number depend on either the File number alone or on the Passport number alone?

The answer to this question is that the data items in the Passport relation **do not** depend on the whole key (i.e. the File number and Passport number). All of the data items in the Passport relation depend upon the Passport number alone. In other words, each of the data items in the Passport relation can be identified by the Passport number, since the Passport number issued to each Applicant is unique at any time. Therefore, data items which depend on the Passport number alone are removed to new relation with Passport number as the key

as shown in Table 4.4 (b). After the data items which depend on the Passport number are removed, Applicant File number and Passport number are left behind.

VISA RELATION

Does each of the data items in the Visa relation depend on the whole key (i.e. the File number, Passport number and Visa number)?

The answer to the above question is **no.** Because all the data items in the Visa relation depend on the Visa number alone. To determine the existence of dependencies, we say 'Y' is dependent on 'X' if and only if for a given value of X there is associated with it precisely one value of Y at any one time.

When we examine the Visa relation, we find that the data items contained in it, such as Visa issue date, expiry date, place of issue, etc., are dependent on the part key data item Visa number alone. That is, for a given value of Visa number, say 3265/75 there are associated with it precisely one values of Visa issue date, Visa expiry date, place of issue, etc., in this case 05-01-75,-05-02-75, Addis Ababa, etc., respectively. However, the opposite is not true in that Visa issue date, expiry date, place of issue, don't determine the Visa number, since many Visas which expire on the same date may be issued on one day at the same place for different Applicants.

Thus, in the Visa relation the data items which are only dependent on the part key - the Visa number, are removed from the original unnormalized relation as shown in Table 4.4 (c), forming the Visa number as the key for the new relation, leaving the File number, Passport number and Visa number behind.

PAYMENT RELATION

The only data item i.e. amount received, in the payment relation doesn't depend on the whole key (i.e. on the File number and Cash receipt number). The cash receipt number is sufficient to identify a particular Payment, since for a given value of the Cash receipt number, there is associated with it precisely only one value of cash Amount received from an Applicant who requested a particular type of Travel document or Visa at one time. The new Payment relation is shown in Table 4.4 (d).

Table 4.4

SECOND NORMAL FORM OF PERSONAL, PASSPORT, VISA AND PAYMENT DATA MAINTAINED ON ETHIOPIAN NATIONALS

PERSONAL DATA RELATION

FILE NUMBER	Region	Height
Personal name	own	Eye colour
Father's name	Worada	Hair colour
Grand Father's name	Kebele	Special mark
Occupation	House number	
Birth date	Tele. number	
Birth place	Id card number	
Domicile	Id card issued by	

(a)

PASSPORT DATA RELATION

File number
Passport number

PASSPORT NUMBER

Passport issue date
Passport expiry date
Passport issued by
Passport issue place
Passport status
Passport Status date
Passport remark
Name of child
Birth date of child
Nationality of child

(b)

VISA DATA RELATION

File number
Passport number
Visa number

VISA NUMBER

Visa issue date
Visa expiry date
Visa issue place
Destination
Purpose of travel
Date of exit
Date of return

(c)

PAYMENT DATA RELATION
File number Cash receipt number **CASH RECEIPT NUMBER** Amount received

(d)

(d) Third Normal Form (TNF)

The Third Normal Form step of the normalization process involves representing the data in Third Normal Form by removing any nonkey data item in the relation that is a fact about another **nonkey** data item to a separate relation.

Third Normal Form is more concerned at identifying data items that might be dependent on the other data items in the relation instead of focusing at nonkey data items that might be dependent on only part of the compound key as in the case with Second Norm Form (Ashworth and Goodland 1990).

A situation where nonkey data item being dependent on another nonkey data item is known as inter-data dependency. In order to identify the existence of inter data dependency, the following set of questions, which act as a cross-check on each other should be asked:

> "(a) Is the data item directly dependent on the key data item(s) of the relation it is in?
>
> (b) Is it directly dependent on any other data items(s) in the system?" (Ashworth and Goodland 1990, 185).

Inter-data dependency which might occur within a compound key identified in the Second Normal Form should also be examined at this stage. If any parts of the compound key are dependent on other parts, then, the dependent data item should be relegated to nonkey items with the determining items remaining in the key.

Generally, TNF involves three types of tests on each of the relations and the data items they contain. These are:

Test 1 Determining if each nonkey data item is directly dependent on the key data item identified in each relation.

Test 2 Detecting if any nonkey data item is dependent on any other nonkey data item (inter-data dependency).

Test 3 Examining if any part of the compound key is dependent on the other part of the compound key.

Data item that have gone through these three tests are said to be in their Third Normal Form. The whole objective of the process is to ensure that each data item in a relation is directly and wholly dependent on the key identified for that relation so that for a given value of the key there is associated with it precisely one value of the dependent data item at any one time. Based on this objective, let us now apply the three tests on each of the relations and data items identified in the Second Normal Form.

PERSONAL DATA RELATION

Looking at the Personal data relation identified by the Applicant's File number, we find that there is only one value of each data item associated with a given value of the File number. Each data item in this relation directly depends on the primary key File number. For example, the data item Applicant name is directly dependent on the key data item File number, since for a given value of Applicant's file number, say 16892, there is associated with it precisely one value of Applicant name, in this case Bekele. However, for a given value of Applicant name - Bekele, there may be several associated values of Applicant file number, as there may be several Applicants known to the Department by the name Bekele.

As to the existence of inter-data dependencies between the data items in the Applicant relation, it seems that there is dependency between Applicant Id number and the institution (employer or Kebele) which issued the Id card to the Applicant. Assuming that a given institution (employer or Kebele) issues one Id number to one person, one may say that for a given value of an employer organization or Kebele, which issued the Id card, there is associated with it only one value of Id number.

This, however, is not the case in reality. There are no rules and regulations which govern the issuance of Id cards across the country. Particularly, there is a serious problem with the Kebeles in that they don't control the Id cards they issue to their Kebele residents and it is not unusual to find two or more Id cards issued to different persons (even by same Kebele) which bear the same Id number. Due to this, some Applicants frequently attempt to take more than one Passport from the Department under false identity. In fact, the difficulty of

establishing the true identity of an Applicant will continue to be a big problem even under the new computer-based immigration and consular system as long as a mechanism is not devised to control the issuance of identity cards through a national agency. (It is worth mentioning here that a proposal regarding the establishment of such institution under the Ministry of Internal Affairs has been prepared and submitted to the government for approval).

Under such a situation, it is difficult to say that there is-inter-data dependency between Id card and the institution to which it belongs, since more than one Id card which bear the same number can be issued (in most cases illegally) by one Kebele to two or more persons. Therefore the Personal data relation identified by the File number is directly transferred to Third Normal Form as shown in Table 4.5 (a).

PASSPORT DATA RELATION

The Passport relation identified by the file number and Passport number is an important one in that most of the activities of the Department, including Visa, revolve around processing the Passport. Hence, the three tests of Third Normal Form are rigorously applied to create a well organized and flexible Passport data relation.

Test one

Does each nonkey data item in the Passport relation directly and wholly depend on the key data item identified for that relation i.e. Passport number?

In other words :-

-Does 'Passport issue date' directly depend on Passport number?

-Does 'Passport expiry date' directly depend on Passport number?

-Does 'Passport status' directly depend on Passport number?

-Does 'Passport issued by' directly depend on Passport number?

-Does 'Passport issue place' directly depend on Passport number?

The answer to all of these questions is **yes** because for a given value of the key data item **Passport number**, for example, E-00175, there should be only one possible value of :

-Passport issue date , say 30-12-74

-Passport expiry date, " 30-12-76

-Passport status, " Void

-Passport issued by, " MIA (Ministry of Internal Affairs)

-Passport issue place, " Addis Ababa

In other words more than one values of each of the nonkey data items described above cannot be associated with a given value of the key data item,i.e. the Passport number. That is, one Passport number can only be issued on a particular date, expires on a particular date, issued by one authority, and issue at a particular place.

Test two

Does any nonkey data item in the Passport relation depend on any other nonkey data item?

The answer to this question depends on the answer obtained in test one above. Since all the nonkey data items depend wholly and directly on the key data item 'Passport number', the answer to Test two is **no**, indicating that there is no inter-data dependencies between the nonkey data items.

Test three

Does any part of the compound key depend on the other parts of the compound key?

This is :-

Does File number depend on Passport number

or

Does Passport number depend on File number

Stated in a more direct form:-

Given a value for File number is there just one possible value for Passport number?

The answer is **no**, because for an Applicant there may be several Passport numbers issued to him/her over a period of time.

Given a value for a Passport number is there just one possible value for File number?

The answer is **yes**, because each Passport number issued at a particular time is unique and it is only for one Applicant, uniquely identified by his File number.

This means that file number is dependent on the Passport number and therefore the relation becomes :

Passport number

* File number

The new position assumed by the file number in the new relation is referred to as **foreign key.** Shepherd defines a foreign key as:

"a field in a file whose values must either be null or match a primary key value for a record in another file. It is one way to relate records of one type to records of another. The file in which the foreign key is found is often called the **dependent file** and the file to which it refers is the **parent file**" (Shephered 1990, 47).

Hence, the File number, which has emerged as a foreign key in the Passport relation, is a primary key in the Personal data relation, that is, the Parent record, which links the Personal and Passport records of given Applicant.

The Third Normal Form of the Passport relation identified by the Passport number is shown in Table 4.5 (b).

VISA DATA RELATION

Test one

Applying test one to the Visa relation in the same way, we find that all the nonkey data items are directly and wholly dependent on the key data item for that relation, that is, the Visa number. For a given value of the Visa number there is always associated with it only one value of Visa issue date, Visa expiry date, place of Visa issue, etc.

Test two

Since all the nonkey data items in this relation depend on the key data item, there is no inter-data dependency between the nonkey data items. This satisfies Test two.

Test three

To determine if there is an inter-data dependency between the components of the compound key, let us pose the following set of questions on any two possible combinations of the key:

- Given a value for a file number, is there just one possible value for Passport number? The answer to this question is **no**, as we have already seen when we examined the Passport relation.
- Given a value for a file number, is there just one possible value of Visa number? The answer to this test again is **no**, since one Applicant can take several Visas.
- Given a value for a Passport number, is there just one possible value of Visa number? The answer to this test again is **no,** since many Visas can be issued on a single Passport.
- Given a value for a Visa number, is there just one possible value for Passport number? The answer to this test is **yes**. Because a given value of Visa number is always associated with a given value of Passport number. In other words, one Visa cannot be issued on different Passports even for the same Applicants.
- Given a value for a Visa number, is there just one possible value of File number? The answer to this question is again **yes** for the similar reason described above.

Thus, the dependent key items from the compound key are relegated to nonkey items acting as a foreign key and the new relation, with the Visa number remaining as key, becomes :

Visa NUMBER

*File number

*Passport number

In the new Visa relation, the File number and the Passport number, which became foreign keys, are the fields which link Visa records of an Applicant with his/her Personal and Passport records. The Third Normal Form for the Visa relation identified by the Visa number is shown in the Table 4.5 (c).

PAYMENT RELATION

In the payment relation the only data item 'amount received' is directly dependent on the Cash receipt number. When we examine the existence of inter-data dependencies between the compound key, we find that the File number is dependent on the Cash receipt number since for a given value of the Cash receipt number, there is just one possible value of the file number. Thus, the new payment relation becomes :

CASH RECEIPT NUMBER

*File number

as shown in Table 4.5 (d).

The Third Normal Form of all the data items maintained about an Ethiopian national to whom Passport and Visa have been issued is presented in Table 4.5

Table 4.5

THIRD NORMAL FORM OF PERSONAL, PASSPORT, VISA AND PAYMENT DATA MAINTAINED ON ETHIOPIAN NATIONALS

PERSONAL DATA RELATION

FILE NUMBER	Region	Height
Personal name	Town	Eye colour
Father's name	Worada	Hair colour
Grand Father's name	Kebele	Special mark
Occupation	House number	
Birth date	Tele. number	
Birth place	Id card number	
Domicile	Id card issued by	

(a)

PASSPORT DATA RELATION

PASSPORT NUMBER
*** FILE NUMBER**
Passport issue date
Passport expiry date
Passport issued by
Passport issued at
Passport at
Passport Status
Passport Status date
Passport remark
Name of child
Birth date of child
Nationality of child

(b)

VISA DATA RELATION

VISA NUMBER
*** FILE NUMBER**
*** PASSPORT NUMBER**
Visa issue date
Visa expiry date
Visa issue place
Destination
Purpose of travel
Date of exit
Date of return

(c)

PAYMENT DATA RELATION

CASH RECEIPT NUMBER
***FILE NUMBER**
Amount received

(d)

4.2.2.2 Record of Persons on Watch List

While describing the entity relationship model, we have seen that the relationship between Applicant/person and record of a particular person in the Watch List is non-obligatory. Because a given Applicant may not be a blacklisted person and a black listed person may exist in the Watch List file without its corresponding Applicant/Person physically coming to request for Passport or Visa from the Department. Therefore, the data items obtained from the Watch List cards and files are analyzed separately.

Since similar records are maintained on foreigners who are not allowed to enter to Ethiopia, normalization of the data items pertaining to this record is not provided here.

The unnormalized Form of the data items held in the Watch List File, representing hypothetical values, are presented in Table 4.6.

Table 4.6

UNNORMALIZED DATA ITEMS OF A RECORD IN A WATCH LIST FILE

DATA ITEMS	D A T A	I T E M	V A L U E S
Personal name	Hailu	Bekele	Hailu
Father name	kebede	kebede	Kebede
Grand Father'name	Tesema	Tesema	Tesema
Occupation	Trader	Trader	Trader
Region	14	14	14
Town	A/A	A/A	A/A
Worada	17	17	17
Kebele	07	07	07
House no.	450	450	375
RE-reference Number	1375/92	1376/92	1376/92
RE-Requested by	A/A H/Court	A/A H/Court	A/A S/Court
RE-Requested date	15-02-92	15-02-92	15-02-92
RE-Expiry date	15-02-93	28-08-92	01-01-93
RE-Reason	Pending court case	Pending court case	Pending court case

As it can be observed from the sample data item values presented above, picking a key that would uniquely identify a particular occurrence of a person in the Watch List is a complex process as it may require a combination of almost all the data item values. However, the sample data item values shown above may be a representation of an extremely rare coincidence.

Although identical full names are not uncommon in real life situation, the full name of a person together with one or two of the other data item values may be sufficient to distinguish one person in the Watch List from the other.

The Restriction Reference Number may be considered to serve as unique key to identify a particular person from the Watch List, assuming that identical reference numbers are not

used by the same or two different courts to file travel restrictions against different persons. But the Immigration and Consular Department doesn't use Restriction Reference Number to check the identity of an Applicant, therefore, Name, Father's name and Grand father's name are used as the primary keys.

The objective of First Normal Form is to remove repeating groups that may have multiple values for a single value of the compound key data item. However, as all the data items relate to the personal particulars of a black listed person, no repeating values can be identified from the relation.

Since no repeating groups have been identified that consist compound key during the First Normal Form, the test of Second Normal Form is not relevant.

In the Third Normal Form, effort is made to weed out nonkey data items that are dependent on one another. However, the data items in the watch list record pass this test. All the data items directly and wholly depend on the key and there is no inter-data dependency between the compound key.

Hence, the data items are directly transferred to the Third Normal Form as indicated in Table 4.7.

Table 4.7

THIRD NORMAL FORM OF THE DATA ITEMS OF A RECORD IN A WATCH LIST FILE

WATCH LIST RELATION
PERSONAL NAME FATHER'S NAME GRAND FATHER'S NAME Occupation Region Town Worada Kebele House number Restriction reference Restriction requested by Restriction requested date Restriction expiry date Restriction reason

4.2.2.3 Record of Foreign Nationals

4.2.2.3.1 Resident Foreigners

Almost all the forms, files and cards used by the Department to maintain records about foreign nationals resident in Ethiopia are old and most of the data items contained in them are not currently being used by the Department. Due to this, the analyst had to conduct several discussions with the management and staff of the Department in order to identify and sift the most useful data elements required by the system to maintain records of all non-diplomatic foreign nationals resident in Ethiopia.

(a) Unnormalized Form

Record of a resident foreigner can be uniquely identified through the file number, assigned to him/her at the time of registration, his/her Residence Permit number or the Passport number. The problem in using Passport number and Residence Permit number as a primary key to identify a particular occurrence of resident foreigner arises when the foreigner changes his/her Passport and Residence Permit. Furthermore, although it is very unlikely that two or more Passports issued by one foreign country can have the same number, the possibility that two or more Passports issued by different foreign countries which may have identical numbers cannot be completely ruled out. Therefore, File number is the most appropriate primary key that can uniquely identify record of a particular resident foreigner from others. The Unnormalized Form of the data items, with the File number as an identifier is presented in the first column of Table 4.8.

(b) **First Normal Form**

Data aggregates that repeat for a single value of the primary key, that is, the file number are :

- the data items associated with Passport;
- the data items associated with Residence Permit;
- the data items associated with Work Permit; and
- the data items associated with Exit Visa.

These are separated to new relations, with a compound key consisting of the File number, inherited from the parent record, and additional data item that uniquely identifies the new relation as shown in Table 4.8. In addition to the File number, the Passport number, the Residence Permit number, the Work Permit/ License number and Exit Visa number can uniquely identify the Passport, Residence Permit, Work Permit/License and Exit Visa relations, respectively. The First Normal Form of the data items is shown in second column of Table 4.8.

(c) **Second Normal Form**

In the Second Normal Form, relations with a compound key as an identifier are tested if they contain data items that depend on part of the compound key only

The data item contained in each of the four relations, identified and removed as repeating groups in the previous step, don't depend on the whole key. The Passport, Residence

Permit, Visa and the Work Permit relations, respectively, depend on the Passport number, Residence Permit number, Visa number and the Work/License number.

These are removed into separate relations with the determining subset of the compound key as an identifier, leaving the compound key behind. The resulting Second Normal Form of the data items is presented in the third column of Table 4.8.

(c) **Third Normal Form**

In the Third Normal Form, nonkey data items that are a fact about other nonkey data items are removed into a new relation to ensure that every data item in each relation is dependent on the primary key identified for that relation, so that for a given value of the primary key there will be associated with it precisely only one value of the nonkey data item.

When we examine the compound keys left behind in the Second Normal Form, we find that the File number associated with each relation is determined by the other subset of the compound key, and is relegated as a foreign key in all the relations. In the Visa relation, the File number and the Passport number became foreign keys, with the Visa number as the primary key.

On the other hand, closer examination of the relation identified by the File number alone reveals that, the data items associated with (a) Entry Visa (b) spouse and (c) dependants of the resident foreigner who are over 19 years of age, don't depend directly on the File number. The data items associated with Entry Visa can be determined by the Visa number. Since Spouse and dependants over 19 years old are required to hold their own Residence

Permit, they can be identified by their respective File numbers. These three data item groups are removed into separate relations, leaving behind the Entry Visa and the File numbers of the spouse and dependant over 19 years old as foreign keys in the Personal record of the resident foreigner. All the remaining data items depend on the File number of the resident foreigner.

The fully normalized records of a resident foreigner are shown in the fourth column of Table 4.8.

Table 4.8

NORMALIZED RECORD OF RESIDENT FOREIGNERS

UNNORMALIZED FORM (UNF)	FIRST NORMAL FORM (FNF)	SECOND NORMAL FORM (SNF)	THIRD NORMAL FORM (TNF)
FILE NUMBER	FILE NUMBER	FILE NUMBER	Personal, Address, and Family Record
First name	First name	First name	FILE NUMBER
Middle name	Middle name	Middle name	
Last name	Last name	Last name	First name
Sex	Sex	Sex	Middle name
Nationality	Nationality	Nationality	Last name
Nationality by birth	Nationality by birth	Nationality by birth	Sex
Date of birth	Date of birth	Date of birth	Nationality
Place of birth	Place of birth	Place of birth	Nationality by birth
Height	Height	Height	Date of birth
Eye colour	Eye colour	Eye colour	Place of birth
Hair colour	Hair colour	Hair colour	Height
Special mark	Special mark	Special mark	Eye colour
Previous occupation	Previous occupation	Previous occupation	Hair colour
Passport number	Entry Visa number	Entry Visa number	Special mark
Passport issue date	Entry Visa type	Entry Visa type	Previous occupation
Passport expiry date	Entry Visa issue date	Entry Visa issue date	Region
Entry Visa number	Entry Visa issue Place	Entry Visa issue Place	Town
Entry Visa type	Entry date	Entry date	Worada
Entry Visa issue date	Region	Region	Kebele
Entry Visa issue Place	Town	Town	House/Flat no.
Entry date	Worada	Worada	Residence telephone No.
Residence Permit numb	Kebele	Kebele	Marital status
Residence Permit issue date	House/Flat no.	House/Flat no.	Name of dependant W.O.R.P.
Residence Permit expiry date	Residence telephone No.	Residence telephone No.	Birth date dependant W.O.R.P
Work Permit/License number	Marital status	Marital status	Sex of dependant W.O.R.P.
Work Permit/License iss.by	File number of spouse	File number of spouse	Remark
Current occupation	Full name of spouse	Full name of spouse	*Entry Visa number
Employer/Business name	Nationality of spouse	Nationality of spouse	*File number of spouse
Office telephone number	Birth date of spouse	Birth date of spouse	*File No. of dependant W.R.P
Region	Occupation spouse	Occupation spouse	Passport Record
Town	File no. dependant W.R.P	File no. dependant W.R.P	PASSPORT NUMBER
Worada	Name dependant W.R.P	Name dependant W.R.P	*File number
Kebele	Nationality dependant W.R.P	Nationality dependant W.R.P	Passport issue date
House/Flat no.	Name of dependant W.O.R.P.	Name of dependant W.O.R.P.	Passport expiry date
Residence telephone No.	Birth date dependant W.O.R.P	Birth date dependant W.O.R.P	
	Sex of dependant W.O.R.P.	Sex of dependant W.O.R.P.	
	Remark	Remark	

W.R.P = With Residence Permit

W.O.R.P = Without Residence Permit

Table 4.8 (cont.)

UNNORMALIZED FORM (cont.)	FIRST NORMAL FORM (cont.)	SECOND NORMAL FORM (cont.)	THIRD NORMAL FORM (cont.)
Marital status	FILE NUMBER	FILE NUMBER	Entry Visa Record
File number of spouse	PASSPORT NUMBER	PASSPORT NUMBER	ENTRY VISA NUMBER
Full name of spouse	Passport issue date		Entry Visa type
Nationality of spouse	Passport expiry date	PASSPORT NUMBER	Entry Visa issue date
Birth date of spouse		Passport issue date	Entry Visa issue Place
Occupation spouse	FILE NUMBER	Passport expiry date	Entry date
File no. dependant W.R.P	RESIDENCE PERMIT NUMBER		Residence Permit Record
Name dependant W.R.P	Residence Permit iss. date	FILE NUMBER	RESIDENCE PERMIT NUMBER
Nationality dependant W.R.P	Residence Permit exp. date	RESIDENCE PERMIT NUMBER	Residence Permit iss. date
Name of dependant W.O.R.P.			Residence Permit exp. date
Birth date dependant W.O.R.P	FILE NUMBER	RESIDENCE PERMIT NUMBER	Work Permit/License Record
Sex of dependant W.O.R.P.	WORK PERMIT/LICENSE NUMBER	Residence Permit iss. date	WORK PERMIT/LICENSE NUMBER
Exit Visa number	Work Permit/License iss.by	Residence Permit exp. date	Work Permit/License iss.by
Exit Visa type	Current occupation		Current occupation
Exit Visa issue date	Employer/Business name	FILE NUMBER	Employer/Business name
Exit Visa expiry date	Office telephone number	WORK PERMIT/LICENSE NUMBER	Office telephone number
Date of exit			Exit Visa Record
Destination	FILE NUMBER	WORK PERMIT/LICENSE NUMBER	EXIT VISA NUMBER
Date of return	PASSPORT NUMBER	Work Permit/License iss.by	Exit Visa type
Remark	EXIT VISA NUMBER	Current occupation	Exit Visa issue date
	Exit Visa type	Employer/Business name	Exit visa expiry date
	Exit Visa issue date	Office telephone number	Date of exit
	Exit visa expiry date		Destination
	Date of exit	FILE NUMBER	Date of return
	Destination	PASSPORT NUMBER	Spouse Record
	Date of return	EXIT VISA NUMBER	FILE NUMBER OF SPOUSE
		EXIT VISA NUMBER	Full name of spouse
		Exit Visa type	Nationality of spouse
		Exit Visa issue date	Birth date of spouse
		Exit visa expiry date	Occupation spouse
		Date of exit	
		Destination	
		Date of return	

W.R.P = With Residence Permit

W.O.R.P = Without Residence Permit

4.2.2.3.2 Record of Non-Resident Foreigners

Record of a non-resident foreigner can be uniquely identified by his/her Passport number. However, to avoid the rare possibility of duplicate Passport numbers, File number is assigned to each, as in the case with the record of non-resident foreigners.

The data items maintained about a non-resident foreigner don't repeat, except when the foreigner extends his/her permitted period of stay in Ethiopia more than once. The results of the analysis are shown in Table 4.9.

Table 4.9

NORMALIZED RECORD OF NON-RESIDENT FOREIGNERS

UNF	FNF	SNF	TNF
File number	File number	File number	File number
First name	First name	First name	First name
Middle name	Middle name	Middle name	Middle name
Last name	Last name	Last name	Last name
Sex	Sex	Sex	Sex
Nationality	Nationality	Nationality	Nationality
Occupation	Occupation	Occupation	Occupation
Date of Birth	Date of Birth	Date of Birth	Date of Birth
Country of residence	Country of residence	Country of residence	Country of residence
Passport number	Passport number	Passport number	Passport number
Number of children	Number of children	Number of children	Number of children
Visa number	Date of entry	Date of entry	date of entry
Visa issue date	Port of entry	Port of entry	Port of entry
Visa expiry date	Address in Ethiopia	Address in Ethiopia	Address in Ethiopia
Visa issue place	Date of exit	Date of exit	Date of exit
Date of entry	Remark	Remark	Remark
Port of entry			
Address in Ethiopia	File number	File number	
Date of exit	Visa number	Visa number	Visa number
Remark			*File number
	Visa issue date	Visa number	
	Visa expiry date		Visa issue date
	Visa issue place	Visa issue date	Visa expiry date
		Visa expiry date	Visa issue place
		Visa issue place	

CHAPTER FIVE

PHYSICAL DESIGN

5.0 INTRODUCTION

Physical design is a process of transformation which involves the conversion of the logical schema developed in the proceeding steps into data constructs of a suitable database Management System (DBMS). In other words, physical design is a move from the logical design to the physical design in which the implementation-independent design, i.e, the logical design, is converted into a design specific for the hardware and software configuration selected (Ashworth and Goodland 1990).

In reality, this step would involve the selection of an appropriate application software and hardware which support the processing requirements of the system under consideration, mapping the logical data models into the specific DBMS software selected, design of input and output formats, development of application programs, etc. These processes, obviously, fall outside the scope of this study.

Hence, in this Chapter initial models of the system incorporating prototype database, sample input and output, methods and techniques of dialogue design and screen layouts, and data input forms are presented, and finally some basic application and policy considerations for networking and software and hardware selection and acquisition are outlined.

5.1 PHYSICAL DATABASE DESIGN

In Chapter Four, an effort has been made, to develop the logical data model of the system independent of the specific Database Management System (DBMS). Physical data design, on the other hand, involves the development of a data model supported by a specific DBMS, which depends on the model of the DBMS used for the construction. Although there are different types of DBMS, they are broadly categorized as hierarchical, network and relational data models.

The hierarchical data model approach is the first to be developed (Rowley 1990) and use parent-child or tree structure to represent the relationship among entities. The basic principle of hierarchical data model is that for one or more subordinates (child) there is only one superior (parent).

The network data model structure is based on the assumption that a given entity can have many number of superiors (parents) as well as many number of subordinates or children (Davis and Olson 1985).

The relational data structure, as described in detail in Chapter Four, is based on set of tables known as relations where each table or relation consists of a row (tuples) representing unique entity occurrence and column representing an attribute. All the data organized in the tables are manipulated through the relationships established between the different tables.

The logical data structure designed in Chapter 4 proposes a relational database management

system (RDBMS). The application software used for developing the physical database design and for user interface, however, is Micro-CDS/ISIS developed by UNSECO. CDS/ISIS is a menu driven generalized information Storage and Retrieval system designed specifically for the computerized management of structured non-numerical database (CDS/ISIS Manual 1989).

Although CDS/ISIS allows to create some kind of links between two records in a database, the linking facilities are too inadequate in comparison to RDBMS software such as dBase, ORACLE, INGRES, etc. However, CDS/ISIS has a number of retrieval facilities which makes the software attractive. The most attractive feature of the software, which makes it useful for various application environments, is its program interface. The CDS/ISIS Pascal interface allows user to develop application programs suitable for one or more specific applications. Although relationships between different pairs of data items from different databases cannot be established in CDS/ISIS, as could be done in an RDBMS software, the required functions can be performed by developing the suitable application programs.

Therefore, two types of prototype databases, logically designed in Chapter 4, have been designed physically by using the standard CDS/ISIS database design module. Sample records have been created in each of these databases. To demonstrate the performance of the prototype system, application for one module, i.e., issue of new Passports, has been developed and interfaced with the databases as described below.

5.1.1 CDS/ISIS DATABASE

CDS/ISIS software allows the creation of new databases using database definition services through four distinct, though related, steps. The steps, as described below, define content, characteristics, and record structure of a given database before it can be accessed for processing.

5.1.1.1 Field Definition Table (FDT)

Field Definition Table (FDT) is the first step in the process of creating a database using CDS/ISIS software which defines the field contents and parameters of the records to be included in a given database. FDT is the basic database module of CDS/ISIS which controls the creation of data entry worksheets and checks the validity of the contents of the fields to be contained in the database record.

5.1.1.2 Data Entry Worksheet

Data Entry Worksheet is a screen-based form which is created immediately after contents of the database is defined in the Field Definition table. It is used to create and/or update records for the defined databases.

5.1.1.3 Display Format

Display format, which consists formatting commands, is used to define how records in the database are to be displayed. Display format is one of the most powerful formatting languages of CDS/ISIS, which allows users to select one or more specific data elements of a record in a database and to display it in any desired way.

5.1.1.4 Field Select Table (FST)

Field Select Table (FST), as its name implies, is used to select or extract fields from a database. It defines the data elements for a given database through the inverted file and is particularly useful for constructing the database terms dictionary. Through the FST, which contains the fields to be inverted and the indexing technique to be used for each field, CDS/ISIS provides unlimited number of access points for each record.

However, unlike other database management software, such as dbase IV, in which a separate index can be created for each searchable field, CDS/ISIS creates only one index for any given database, which is functionally equivalent to a multiple Inverted file approach as is the case with the other database management software (CDS/ISIS Manual 1989, 6).

5.1.2 PROTOTYPE DATABASE DESIGN

Following the data definition procedures described above, two prototype databases are designed for the proposed computer-based Immigration and Consular System.

These are:

(1) The Watch List Database which consists data on Ethiopian nationals against whom travel restriction has been filed by a court of competent jurisdiction; and

(2) The Passport Database which holds list of Ethiopian nationals to whom Passport has been issued by the Department.

In the Watch List Database, a total of 20 sample records have been created consisting all the data items identified and analyzed in the preceding chapters. In the Passport database, a total of 40 sample records have been created, which consist of Personal and Passport data to be maintained by the new system on all Ethiopian Passport holders.

For the Watch List Database, Personal name, Father's name, Grand Father's name of the restricted person as well as Restriction reference number and Name of the Court which order the restriction, are indexed. For the Passport Database, File number, Personal name, Father's name, Grand Father's name of the applicant as well as the Passport number, issue date, expiry date, and its status, are indexed. These fields provide multiple access points to each record maintained in the two Databases. The collection of these access points form the dictionaries for the databases from which users can build queries.

The Field Definition Tables (FDT), Data Entry Worksheets, Field Select Tables (FST) and Display Formats used to create the two databases appear in Appendix D.

5.1.3 DEVELOPMENT AND OPERATION OF THE PROTOTYPE SYSTEM

5.1.3.1 DEVELOPMENT OF THE PROTOTYPE SYSTEM

Application program covering all the functions of the new system couldn't be developed mainly due to time constraint. Instead, to demonstrate the performance of the prototype system, application program for one module, i.e., issue of new Passport, has been developed using the CDS/ISIS Pascal interface.

While describing operation of the existing system in Chapter two, we have seen that processing application for new Passport is the most challenging task to users in the Immigration and Consular Main Department. Before processing and issuing a new Passport, users have to first check whether travel restriction has been filed or not against the applicant. Once they establish that no travel restriction is filed against the person, they should also make sure that a Passport has never been issued to that person. Due to the large volume of files and cards, users find it difficult to undertake these activities. Particularly, since they cannot check the cards which contain information on issued Passports, they are usually forced to issue Passports as requested which has led to a situation in which a person can have more than one valid Passports.

The two prototype databases described in section 5.1.2 and the application program discussed in this section are, therefore, intended to address this fundamental problem and show how difficulties associated with checking the Watch List and Passport Files can be solved by the new computer-assisted Passport issuance system.

The flow chart used to develop the application program based on the procedures involved in processing application for a new Passport is presented in Figure 5.1.

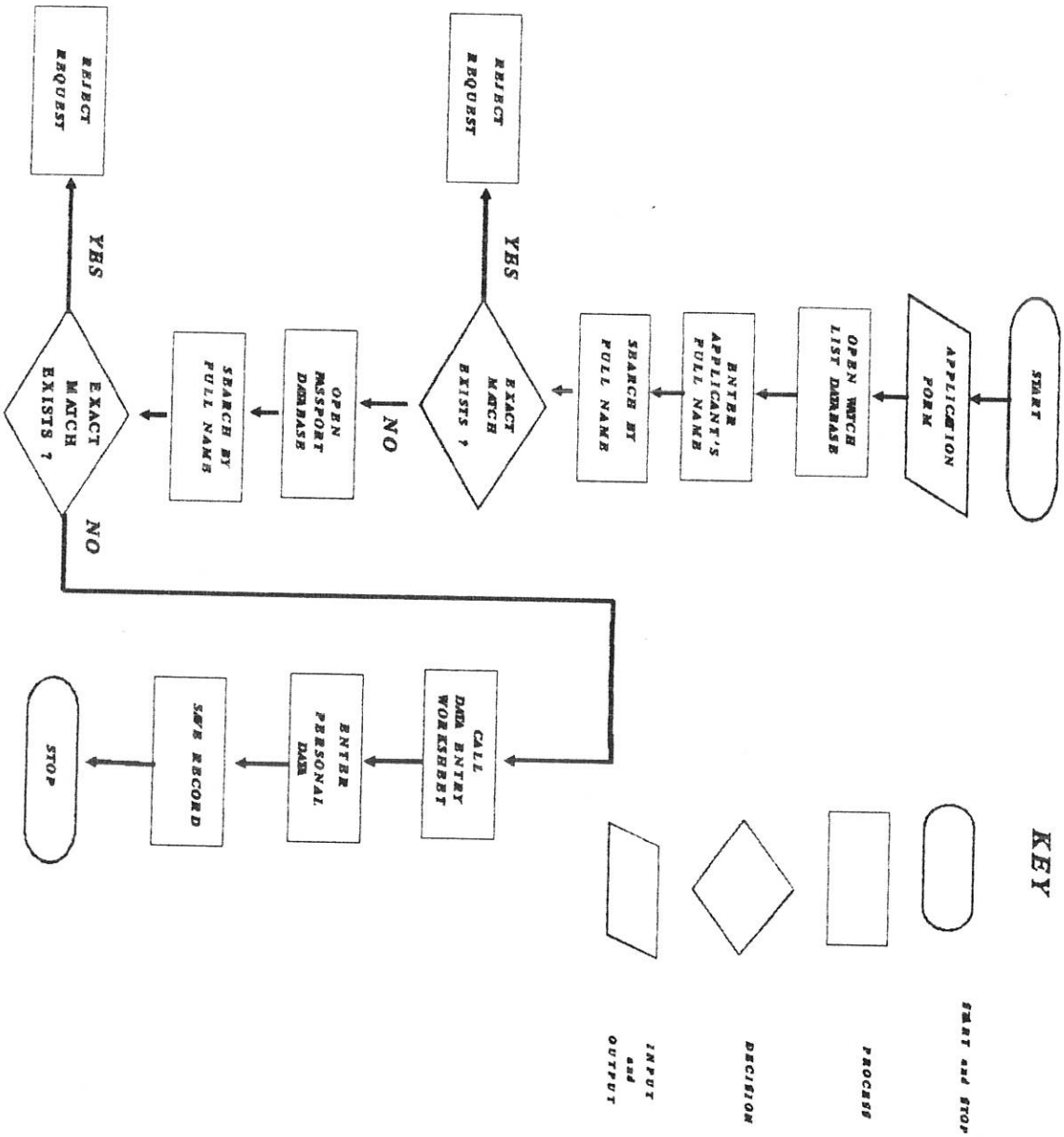


FIGURE 5.1 Program flow chart for checking and recordingapplication for new Passport

5.1.3.2 OPERATION OF THE PROTOTYPE SYSTEM

This section discusses the operation of the application program developed to demonstrate functions of the prototype system for the issue of a new Passport; the corresponding screen displays appear in Appendix F. The program which links the two prototype databases, required to process a request for a new Passport, is known as ICDDES. ICDDES is an acronym for Immigration and Consular Department Data Entry Service; the source code for ICDDES appears in Appendix E.

When the CDS/ISIS software is successfully installed on the computer, ICDDES can be run from option 'A' -Advanced programming services- of the Micro CDS/ISIS main menu by pressing the R[un] option.

After the correct program name, i.e, ICDDES, is supplied to the CDS/ISIS software, the system displays the first screen which conveys a welcoming statement, and requests the user at the data entry terminal to press any key to continue operating the system (see Screen 1).

When any key has been pressed, the system displays a second screen requesting the user at the data entry terminal to enter his/her Password (see Screen 2). The system allows the user to enter his/her Password three times, in case the user fails to remember his/her Password. But if he/she fails to enter the correct Password three times, the program automatically aborts the system and displays a massage that the person who attempted to login to the system is not an authorized user and is denied access to the data entry service(see Screen 3 & 4).

On the other hand, if the user enters his/her Password correctly, the Main Data Entry Menu appears on the screen (see Screen 5). Each option in the Main Menu activates other lower-level data entry submenus and the user calls these submenus by pressing the letter of choice from the Main Menu.

However, in order to prevent unauthorized entry into the system, the user is again requested by the system to key his/her Access Code before he/she is allowed to access each data entry submenu (see Screen 6). The program gives one more chance to the user to enter his/her Access Code correctly, and if he/she fails to do so, the system displays a message telling that the current user is not authorized to access the data entry option he/she has selected, and to press the 'enter key' to return to Data Entry Main Menu (see Screen 7 & 8). For each correct access code entered by the user, four data entry submenus namely, Passport, Passport and Visa, Visa and Residence Permit, are activated (see Screen 9, 10, 11, &12).

Program ICDDES is developed to fully execute the functions of issuing a new Passport by the new system after an authorized user has successfully accessed the 'A-PASSPORT' option from the Data Entry Main Menu (see Screen 9).

When the user selects option 'N' for new Passport, from the Passport Data Entry Submenu, a blank data entry worksheet appears on the screen for the user to enter full name of the applicant requesting for a new Passport (see Screen 9N-1). In order to conduct the subsequent operations, the personal name, father's name and grand father's name of the applicant, are required. The cursor cannot be moved from one line to the other without some string values being assigned to each of the field names, thereby preventing the user

from skipping any part of the applicant's full name.

When all the three names of the applicant are entered, the system requests the user to press the 'enter key' to check if any travel restriction has been filed against the applicant by any court of competent jurisdiction.

After this has been done by the operator, the program first opens the Watch List Database and automatically conducts a search to find out if a record that exactly matches with the applicant's full name exists in the Watch List Database (see Screen 9N-2).

If the program finds a record that exactly matches with the applicant's personal name, father's name and grand Father's name, the program alerts the operator by turning audible sound, and then displays a warning followed by full name extracted from the Watch List Database which exactly matches with the applicant's full name (see Screen 9N-3). The operator is then prompted with an option for further detail and full description of the person can be obtained from the Watch List Database by pressing the Y(es) option (see Screen 9N-4).

After retrieving full description of the person against whom the system displayed warning for a black list, the operator at the data entry terminal inspects the detail information extracted from the Watch List Database. Upon inspection, if the user is certain that the applicant is a person against whom a travel restriction has been filed, the request is rejected and the process is terminated by pressing the N(o) option.

But if the operator doesn't want detail information on the person, he can terminate processing the request by simply pressing the N(o) option immediately after a warning about the existence of a matching record is displayed by the system, or can proceed further by pressing option Y(es).

On the other hand, if a record which exactly matches with the applicant's personal, father's and grand father's name is not found in the Watch List Database, the system provides a message accordingly (see Screen 9N-5) and asks user to press <C> to continue or <N> to quit.

If the operator has chosen option <Y> from Screen 9N-4 or option <C> from Screen 9N-5, the program continues to check the Passport database (see Screen 9N-6). If the program finds a record in the Passport Database which exactly matches with the applicant's full name, the system alerts the user at the terminal by turning audible sound, and then displays a warning reminding him/her that the applicant about whom a matching record has been found in the Database may be attempting to take Passport illegally (see Screen 9N-7). The operator can brows more information about the highlighted person by the pressing Y(es) option for further detail (see Screen 9N-8). But if the operator doesn't feel that he/she needs further information, he/she can avoid this process by simply pressing the N(o) option.

After detail display of Passport record, if it has been found that the applicant is not the person to whom a Passport has been issued by the Department, the operator is prompted with an option to create a new record. If the operator doesn't want to create a new record, he/she can terminate the process and return to the Passport Data Entry Menu by pressing

the N(o) option; otherwise he/she can choose the Y(es) option to continue further.

On the other hand, if the program doesn't find a record in the Passport Database that exactly matches with the applicant's full name, it produces a message accordingly and asks user to choose the option Y(es) to create a new record for the applicant, or to terminate the program by choosing option N(o) (see Screen 9N-9).

If the user presses option Y(es), from either of the Screen 9N-8 or 9N-9, for the creation of a new record, the program calls another screen for confirmation that the operator really wants to create a new record (see Screen 9N-10). This feature is added into the system to make sure that the user has made the right decision before he/she is allowed to create a new record about the applicant so that every data entering to the system is required by the users. Therefore, if the operator doesn't want to create a new record, he/she can again terminate the program and return to the Passport Data Entry Menu by simply pressing the N(o) option.

If the operator has confirmed to the system by pressing the Y(es) option that he/she wants to create a new record about the applicant, the program calls the Passport data entry worksheet (see Screen 9N-11). Then, the data entry operator at the terminal fills personal information about the applicant from the completed Passport/Visa application form. The lower section of the worksheet containing entries related to Passport data are to be filled by the Passport clerks at the Passport Main Section when the Passport is prepared and written.

After the data has been entered, the record is saved in the Passport database and the

program automatically updates the inverted file for the newly created record.

When the inverted file updating processes is completed (see Screen 9N-12), the program conveys this message, confirms that a new record has been created and requests the operator to go back to the Passport Data Entry Menu by pressing the 'enter key' (see Screen 9N-13).

5.2 FORMS DESIGN

Forms can be used as input into or output from a computer-based system. In the new system, the major forms are input forms. Output from the system is mainly screen-based. In most of the cases, small timely and reliable online information is required by users instead of printed reports. Therefore output forms are not covered in this section.

Input forms can be paper or electronic media which are used to collect data required by a system from the point of origin or from the place where transactions which are of interest to the system are taking place (Rowley 1990).

In order to eliminate costly transcription processes which increase both the number of errors and the time taken to get data into the computer, the trend in recent years has been to collect data as close to its source as possible. In this respect on-screen forms are preferred to input data directly into the computer system since they allow immediate and relatively fast updating and error correction process.

This, however, depends on the nature of data, working environment and the number of people involved in the input process. For a system like the Immigration and Consular Department which collects data from the "general Public", and for a data that must pass through rigorous security validation processes, it would be unrealistic to allow the applicant to enter his request directly into the system by himself.

Therefore the paper application forms, issued by the Department and filled by the applicant, will continue to be the most important source of input for the new computer-based system. Currently, these forms are being used not only as a data collection device but also as means of data storage about each applicant. In the new computer-based system, these paper forms will mainly be used to collect data from the applicant for input into the computer system. Hence, the application forms are designed to contain only the data items which are required from the applicant. Data items that are normally added when the request is transcribed into the system, and those that evolve after the requested travel document, Visa or Residence Permit is prepared, are removed from the new application forms. Data items which don't exist in the current application forms but that have been identified during the analysis are also included. The new forms to be used by the computer-based system are shown in Figure 5.2 - 5.8.

The application forms filled by the applicant will be collected, verified and entered into the computer system by key operators working at one of the workstations located at the Reception Section. To facilitate the data entry activity and minimize data transcription errors, the paper and screen forms should be compatible with one another and attempt should be made to reflect the lay out of the application forms on the screen.

To demonstrate layout and content of the data input screen forms for the computer based system, sample screen forms to be used to enter data pertaining to requests for Passport and Visa are presented in the section which deals with user interface design (see section 5.3). Most problems with accuracy occur at the data input stage of any transaction processing system. So it is very important to ensure the accuracy and validity of the data entering the system. In the actual development of the system, steps ranging from clerical checks on the application forms to detail programming procedures which validate incoming data should be introduced.

ENPV-00001/95

PASSPORT AND VISA APPLICATION FORMS FOR ETHIOPIAN APPLICANTS

(The form must be filled correctly and clearly)

PERSONAL NAME..... FATHER'S NAME.....GRAND FATHER'S NAME.....

OCCUPATION..... ID NUMBER.....ID CARD ISSUED BY.....

DOMICILE.....REGION.....TOWN.....WORADA.....KEBELE.....HOUSE NO..... Residence Tele No.....

TYPE OF REQUEST (mark your request in the box provided)

(a) Passport only [ ] (b) Passport and Visa [ ] (c) Visa only [ ]

(d) Laissez-Passer only [ ] (d) Laissez-Passer and Visa [ ]

FILL THE ENTRIES BELOW BASED ON YOUR REQUEST. IF YOU ARE REQUESTING BOTH PASSPORT AND VISA FILL THE ENTRIES INDICATED UNDER 'A' AND 'B'

A. TO BE FILLED BY PASSPORT APPLICANTS

BIRTH DATE ..... BIRTH PLACE.....

HEIGHT.....EYE COLOUR.....HAIR COLOUR.....SPECIAL MARK.....

CHILDREN TRAVELLING WITH ON THE SAME PASSPORT

Name of child	Birth date	Nationality
(a).....	.....	.....
(b).....	.....	.....

B. TO BE FILLED BY VISA APPLICANTS

PREVIOUS PASSPORT NUMBER.....

TYPE OF VISA REQUESTED (a) Multiple trip [ ] (b) Single trip [ ]

VISA REQUESTED FOR (a) ..... Days (b) .....Month(s)

PURPOSE OF TRAVEL ABROAD (mark the appropriate box)

(a) Official [ ] (b) Scholarship [ ] (c) Medical [ ]

(c) Pilgrimage [ ] (d) Visit [ ] (e) Residence [ ]

(f) Business [ ] (g) Other.....

DESTINATION.....

Signature of applicant.....

Date form filled.....

Figure 5.2 New Passport and Visa Application Forms for Ethiopian Applicants

ENRC-00001/95

PASSPORT/LAISSER-PASSER REPLACEMENT, RENEWAL AND CORRECTION APPLICATION FORM WITH OR WITHOUT VISA

(The form must be filled correctly and clearly)

PERSONAL NAME..... FATHER'S NAME.....GRAND FATHER'S NAME.....

PREVIOUS PASSPORT/LAISSER-PASSER NO.....

DOMICILE.....REGION.....TOWN.....WORADA.....KEBELE.....HOUSE NO..... RESIDENCE TELE NO.....

OCCUPATION.....ID NUMBER.....ID CARD ISSUED BY.....

TYPE OF REQUEST (Mark your request in the box provided)

(a) [ ] Passport or Laissez-Passer replacement. To be replaced by

[ ] Passport [ ] Visa

(b) [ ] Passport Renewal

(c) [ ] Passport correction (write down the type of correction to be made on your Passport on the space provided below)

ENTRIES INDICATED BELOW ARE TO BE FILLED BY APPLICANTS REQUESTING VISA

TYPE OF VISA REQUESTED (a) Multiple trip [ ] (b) Single trip [ ] (c) Extension of Visa [ ]

VISA REQUESTED FOR (a) ..... Days (b) .....Months

PURPOSE OF TRAVEL ABROAD (mark the appropriate box)

(a) Official [ ] (b) Scholarship [ ] (c) Medical [ ]

(c) Pilgrimage [ ] (d) Visit [ ] (e) Residence [ ]

(f) Business [ ] (g) Other.....

DESTINATION.....

Signature of applicant.....

Date form filled.....

Figure 5.3 New Passport/Laisser-Passer Replacement, Renewal and Correction Application Form

ENVE-00001/95

VISA EXTENSION APPLICATION FORM FOR ETHIOPIAN NATIONALS

PERSONAL NAME..... FATHER'S NAME.....GRAND FATHER'S NAME.....

PREVIOUS PASSPORT/LAISSER-PASSER NO.....

VISA NUMBER..... VISA ISSUE DATE.....

Signature of applicant.....

Date form filled.....

Figure 5.4 New Visa Extension Application Form for Ethiopian Nationals

RFRP-00001/95

RESIDENCE PERMIT APPLICATION FORM

FIRST NAME.....MIDDLE NAME.....LAST NAME.....SEX.....BIRTH D/.....BIRTH P/.....

NATIONALITY.....NATIONALITY BY BIRTH.....HEIGHT.....EYE/C..... HAIR C/..... SPECIAL MARK.....

COUNTRY OF RESIDENCE .....PREVIOUS OCCUPATION (before coming to Ethiopia).....

PASSPORT NUMBER.....PASSPORT ISSUE DATE.....PASSPORT EXPIRY DATE.....

ENTRY VISA NO.....VISA TYPE.....ISSUE DATE.....ISSUE PLACE ..... DATE OF ENTRY.....

PORT OF ENTRY.....

MARITAL STATUS : MARRIED [ ] SINGLE [ ]

FULL NAME OF SPOUSE.....BIRTH DATE..... NATIONALITY .....OCCUPATION .....

CHILDREN (DEPENDANTS):-

(a) OVER 19 YEARS OF AGE

FULL NAME	BIRTH DATE	NATIONALITY	SEX
(1).....	.....	.....	.....
(2).....	.....	.....	.....

(b) UNDER 19 YEARS OF AGE

FULL NAME	BIRTH DATE	NATIONALITY	SEX
(1).....	.....	.....	.....
(2).....	.....	.....	.....

WORK PERMIT NUMBER/LICENSE NUMBER..... ISSUED BY..... ISSUE DATE..... EXPIRY DATE.....

CURRENT OCCUPATION ..... EMPLOYER/BUSINESS NAME.....OFFICE TELE NO.....

ADDRESS IN ETHIOPIA:- EGION.....TOWN.....WORADA.....KEBELE.....

HOUSE/FLAT NO..... RES.TELE.NUMBER.....

FILL THE ENTRIES BELOW IF YOU WERE IN ETHIOPIA SOME TIME BEFORE

DURATION OF STAY :- FROM..... UNTIL.....

PREVIOUS OCCUPATION.....PREVIOUS WORKING

PLACE/ORGANIZATION.....

Signature of applicant.....

Date form filled.....

Figure 5.5 New Residence Permit Application Form

RFRR-00001/95

RESIDENCE PERMIT RENEWAL APPLICATION FORM

FIRST NAME.....MIDDLE NAME.....LAST NAME.....

NATIONALITY.....PASSPORT NUMBER.....PASSPORT ISSUE DATE.....PASSPORT EXPIRY DATE.....

PRESENT OCCUPATION..... PRESENT EMPLOYER/BUSINESS NAME.....PRESENT WORKING PLACE TELE.NO.....

RESIDENCE PERMIT NUMBER.....

CHILDREN (DEPENDANTS) WITHOUT RESIDENCE PERMIT :

FULL NAME BIRTH DATE NATIONALITY SEX

(1)..... .... (2).....

....

(3)..... ....

CURRENT WORK P/ NO./LICENSE NO.....ISSUED BY..... ISSUE DATE..... EXPIRY DATE.....

CURRENT OCCUPATION .....CURRENT EMPLOYER/BUSINESS NAME.....CURRENT OFFICE TELE NO.....

CURRENT ADDRESS IN ETHIOPIA:-

REGION.....TOWN.....WORADA.....KEBELE.....HOUSE/FLAT NO..... RES.TELE.NUMBER.....

WRITE DOWN ANY PERSONAL OR FAMILY CHANGE TO BE REPORTED SINCE THE LAST RESIDENCE PERMIT WAS ISSUED TO YOU

.....

.....

.....

Signature of applicant.....

Date form filled.....

Figure 5.6 New Residence Permit Renewal Application Form

RFVR-00001/95

VISA APPLICATION FORM FOR RESIDENT FOREIGNER

FIRST NAME .....MIDDLE NAME.....LAST NAME..... NATIONALITY.....

RESIDENCE PERMIT NUMBER.....

PASSPORT NUMBER..... PASSPORT ISSUE DATE.....PASSPORT EXPIRY DATE.....

NUMBER OF PERSONS TRAVELLING ON THE SAME PASSPORT.....

CURRENT ADDRESS (IF THERE IS A CHANGE, FILL YOUR NEW ADDRESS IN THE SPACE PROVIDED BELOW):

REGION.....TOWN.....WORADA.....HOUSE/FLAT NO. RES..... TELE. NO.....

TYPE OF VISA REQUESTED (mark your request in the box provided)

(a) Re-entry [ ] (b) Multiple trip [ ] (c) Exit [ ]

VISA REQUESTED FOR (a) ..... Days (b) .....Months

Signature of applicant.....

Date form filled.....

Figure 5.7 New Visa Application Form for Resident Foreigners

RFVR-00001/95

VISA APPLICATION FORM FOR RESIDENT FOREIGNER

FIRST NAME ... .MIDDLE NAME.....LAST NAME..... NATIONALITY.....

RESIDENCE PERMIT NUMBER.....

PASSPORT NUMBER.....PASSPORT ISSUE DATE.....PASSPORT EXPIRY DATE.....

NUMBER OF PERSONS TRAVELLING ON THE SAME PASSPORT.....

CURRENT ADDRESS (IF THERE IS A CHANGE, FILL YOUR NEW ADDRESS IN THE SPACE PROVIDED BELOW):

REGION.....TOWN.....WORADA.....HOUSE/FLAT NO. RES..... TELE. NO.....

TYPE OF VISA REQUESTED (mark your request in the box provided)

(a) Re-entry [ ] (b) Multiple trip [ ] (c) Exit [ ]

VISA REQUESTED FOR (a) ..... Days (b) .....Months

Signature of applicant.....

Date form filled.....

Figure 5.7 New Visa Application Form for Resident Foreigners

RFVR-00001/95

VISA APPLICATION FORM FOR NON-RESIDENT FOREIGNER

FIRST NAME .....MIDDLE NAME..... ..LAST NAME..... NATIONALITY.....

DATE OF BIRTH.....PASSPORT NUMBER.....PASSPORT EXPIRY DATE.....

NUMBER OF PERSONS TRAVELLING ON THE SAME PASSPORT.....

ADDRESS IN ETHIOPIA:.....

VISA USED TO ENTER TO ETHIOPIA :- VISA NO.....TYPE.....ISSUE PLACE.....ISSUE DATE.....EXPIRY DATE.....

DATE OF ENTRY.....PORT OF ENTRY.....

VISA REQUESTED FOR .....Days ....Month(s)

Signature of applicant.....

Date form filled.....

Figure 5.8 New Visa Application Form for Non-Resident Foreigners

5.3 USER INTERFACE DESIGN

At the physical operation stage, the most important feature of any computer-based system with which the user is likely to become most involved is user-computer interface, which enables him/her to interact with the computer.

User's perception of a system's success or failure is highly dependent on the effectiveness of the dialogue design. Because to the user, the system is represented by its interface. The user can easily get disappointed and may tend to avoid using the system, particularly if it "involves inconsistent command languages, confusing operation sequences, chaotic screen layouts, inconsistent terminology, incomplete instructions, and misleading error messages" (Zemedeberhan, 1994).

The design of a particular user interface depends on a number of factors. However, the most important consideration, which directly affects the design of a particular user-interface, is the experience and the frequency with which the user gets in touch with the system. It should be flexible enough to accommodate both a novice and an expert user. A good interface should provide instruction to the novice user, but should also give a short cut means of manipulating the system for the more expert user.

Users in the Immigration and Consular Department can be categorized as novice, since they have no prior exposure to computer-based systems. Therefore, the initial feature of the interface should be designed in a way that would cater for the need of these category of users. However, as they acquire more experience in using the system, it should be capable

of being amended to accommodate changes in activities of the users.

Although there are many kinds of dialogue design styles, the screen dialogue design which is suitable for the purpose is, a mixture of menu selection and form filling. With menu format, the user is shown a list of options and is expected to choose the appropriate option by positioning a cursor or by pressing the number or letter associated with each option. Forms filling screen design is, an image of the paper form. Forms-based screen dialogues are used particularly for those activities which involve data entry functions, and, as mentioned earlier, in the sample user interface design presented in appendix F an attempt is made to reflect lay out of the application forms on the screen.

Full scale Dialogue design is a complex task and may take considerable time and effort. To mention a few, it involves collecting information on dialogue users, their activities and their background; defining jargons, abbreviation and codes understood by the users; determining specific features of the hardware on which the interface is to be implemented, the software, particularly, the operating system which governs the facilities which can be built into the screen dialogue etc. (Rowley 1990, Eardley, Marshall and Ritchie 1991).

Obviously, all these factors could not be considered in this study. Therefore, the general layout of the dialogue structure is presented hierarchically in Figure 5.9. From this, a sample dialogue is presented for the Passport data entry process option (see Appdenix F). Procedures followed in designing this option can be carried over to the processes which should adhere to similar styles and standards for the remaining processes.

Since most of the data and files maintained by the Department are sensitive, the dialogue design must ensure different levels of password-access system. Each workstation operator may be allowed to access a particular data entry option. For example, a data entry clerk in charge of handling Passport requests may be allowed to access the Passport data entry option and in the process of checking the applicant's name in the Watch list and Passport databases, he/she may only be permitted to read contents of the record retrieved from the these databases. An attempt is made to reflect this requirement in the sample dialogue designed for the prototype system.

MAIN MENU

A. PASSPORT
B. PASSPORT AND VISA
C. VISA
D. RESIDENCE PERMIT

OPTION A : PASSPORT

SUBMENU

N. NEW PASSPORT
R. RENEWAL OF PASSPORT
E. CORRECTION OF PASSPORT
F. REPLACEMENT OF PASSPORT

OPTION B: PASSPORT AND VISA

SUBMENU

G. NEW PASSPORT AND VISA
H. RENEWAL OF PASSPORT & VISA
I. CORRECTION OF PASSPORT & VISA
J. REPLACEMENT OF PASSPORT AND VISA

OPTION C: VISA

SUBMENU

K. ETHIOPIAN NATIONALS
L. RESIDENT FOREIGNERS
M. NON-RESIDENT FOREIGNERS

OPTION K: ETHIOPIAN NATIONALS

WORKSHEET

O. NEW VISA
P. EXTENSION OF VISA

OPTION D: RESIDENCE PERMIT

SUBMENU

S. NEW RESIDENCE PERMIT
T. RENEWAL OF RESIDENCE PERMIT

Figure 5.9 Hierarchical layout of Data Entry Menus, Submenus and Worksheets

MAIN MENU

A. PASSPORT
B. PASSPORT AND VISA
C. VISA
D. RESIDENCE PERMIT

OPTION A : PASSPORT

SUBMENU

N. NEW PASSPORT
R. RENEWAL OF PASSPORT
E. CORRECTION OF PASSPORT
F. REPLACEMENT OF PASSPORT

OPTION B: PASSPORT AND VISA

SUBMENU

G. NEW PASSPORT AND VISA
H. RENEWAL OF PASSPORT & VISA
I. CORRECTION OF PASSPORT & VISA
J. REPLACEMENT OF PASSPORT AND VISA

OPTION C: VISA

SUBMENU

K. ETHIOPIAN NATIONALS
L. RESIDENT FOREIGNERS
M. NON-RESIDENT FOREIGNERS

OPTION K: ETHIOPIAN NATIONALS

WORKSHEET

O. NEW VISA
P. EXTENSION OF VISA

OPTION D: RESIDENCE PERMIT

SUBMENU

S. NEW RESIDENCE PERMIT
T. RENEWAL OF RESIDENCE PERMIT

Figure 5.9 Hierarchical layout of Data Entry Menus, Submenus and Worksheets

5.4 BASIC CONSIDERATIONS IN NETWORK PLANNING AND HARDWARE AND SOFTWARE SELECTION FOR THE PROPOSED SYSTEM

A Network can generally be defined as a system that allows computer users to connect their system and share resources, files and programs (Sheldon 1990). There are different levels of networks, ranging from those that exist within a single office, known as Local Area Network, to those that span cities and countries, known as Wide Area Network.

It has been mentioned in the general design stage (Chapter 3) that, to process travel requests, the Immigration and Consular Main Department needs Local Area Network at the head office. This network system must be connected through a communication line to the Immigration branch office at Bole to monitor incoming and outgoing passengers transiting through the the airport.

As has been identified during the analysis stage (Chapter 2), although it has some problems, the system installed at Bole airport is already networked. Through a compatible communication network it should be integrated with the LAN to be installed at the head office.

Recently, the system at Bole airport has started transferring list of incoming and outgoing passengers to the head office through a modem. However, most of the data being transferred, particularly about Ethiopian nationals and resident foreigners are those already maintained at the head office when a Visa is issued to the passenger. The only data items that need to be transferred from Bole to the head office about these group of passengers are

the date of exit, destination and date of return. However, full information is required about non-resident foreigners entering to and leaving the country from the Immigration branch office at Bole. The branch office, on the other hand needs list of persons who are not permitted to enter to or leave the country from the head office.

Hence, attempts to integrate the two systems should take these requirements into account. Furthermore, if the two systems are interconnected and fully integrated, with the workstations at the airport having direct access to the central server(s) to be installed at the head office, it may not be necessary for Immigration branch office at Bole to maintain data about incoming and outgoing passengers. These records can be created or updated at the head office directly from the workstations at Bole.

To simplify the load on the central server(s) of the LAN in the head office and to minimize response time, the Watch List File on incoming and outgoing passengers should also be hled at the Immigration branch office in Bole so that it would be readily accessible by the workstations located at the entry and exit points in the airport.

This is general description of the information flow that should exist between the head office and the branch office at Bole. However, the technology of Local Area Network (LAN) is complex and needs assessement involving detailed evaluation of the actual as well as forcasting future needs. Detailed evaluation and analysis of current and potential application requirements, volume of tasks, fluctuations in volume of work within the year, high and low periods, etc., is required.

On the technical aspect, analysis of not only the network hardware required but also methods and procedures required to establish a network system have to be done. This includes, among other things, specifications such as the type of server(s) hardware required, interface card to be used, the cabling system, type and the number of workstations, the architecture of a network that defines the length of the cabling system and workstations attached to it, as well as the rules and protocols to transfer signals from one workstation to another.

In order to determine physical location as well as the number of workstations, factors such as data transmission speed, busy hour traffic, processing time required to transmit data, workstation utilization rate, average volume of information per transaction (kb/transaction), average transaction per second, average transaction per day, volume of information per day, etc., need to be thoroughly analysed.

As indicated in the scope of this study, data on these and similar aspect of the LAN environment under consideration could not be collected mainly due to shortage of time and some of the technicalities involved in the process.

Therefore, after detail analysis and evaluation of the department's networking needs and formulating the goals and objectives of the proposed LAN, due consideration should be given to the following main components of LAN in relation to the application requirements of the Department and in line with the government policy with regard to the acquistion of hardware and software.

5.4.1 THE SERVER(S)

At the heart of any network system is the server(s) which facilitates access to shared resources. The central server(s) entrusted with storing the Watch List, Passport, Visa and Residence Permit files must have good performance rate, high level of reliability, back up and security. It must be powerful enough to run the network system and offer file storage, user management, security, common network commands, etc.

Taking the current state of the art into consideration, the minimum system configration set by the Ethiopian Government for the acquisiton of server(s) in a LAN environment is as presented below. This minimum recommended system configuration was intorduced in 1987 EC (1994/95)* and is subject to periodic update by the National committee whose secretariat is the National Computer Center of the Ethiopian Science and Technology Commission.

Main system	
Central Processing Unit	i486 DX" 66 MHz or equivalent
Memory	16MB 70 ns expendable to 64 MB
Hard drive (disk)	440MB
Floppy drive	3.5"1.44MB
I/O controller	VLB IDE
Bus	VESA Local Bus
Moniter	14" VGA 0.28mm dot pitch
Backup tape	streamer tape backup capacity greater than the hard disk capacity
Video card	512KB VGA Card
Ports	2 serial, 2 parallel
Case	minitower/desktop 230 W Power supply

* Policy Guideline on the acquisition of hardware and software, Transitional Government of Ethiopia, Prime Minister's Office, October 7, 1994.

Therefore, taking this minimum recommended system configuaraion as a starting point and the cost involved, signigicant considerations such as capacity, memory size, hard disk storage requirment, etc., must be taken into account depening on the size of the LAN to be installed.

As the database application continues to grow in size, the processing speed of the server(s) may slow down. To upgrade and improve the performance of the system features such as multi-processor can be added at a later stage.

5.4.2 WORKSTATION

In addition to those installed at Bole airport, the Department requires a number of workstations at the data entry points in the Reception Section, at the Passport and Visa Sections and, possibly, at the Archive Section in the head office that will be attached to the central server(s).

Depending on the operation some of these units may use diskless workstations and rely on the network server(s) to fetch and run application programs and data required by them. Diskless workstations are inexpensive and provide security because users cannot download files from the central server(s) to the to disk.

However due to the workload and the frequency of access, sections or service units that demand too much of the server(s) time should be identified and be allowed to perform the basic operations by their own.

Therefore, for the sections or service units that require intelligent workstations, the following minimum recommended system configaration is set by the Ethiopian Government and decision as to what kind of client server should be aquired must be made based on this minimum specification.

Central Processing Unit	i486 DX" 33 MHz or equivalent
Memory	4MB 70 ns expendable to 16 MB
Hard drive (disk)	210MB
Floppy drive	3.5"1.44MB AND 5.25" 1.2MB
I/O controller	IDE
Bus	ISA
Moniter	14" VGA 0.28mm dot pitch
Video card	1MB VGA Card
Ports	2 serial, 2 parallel
Case	minitower/desktop 200 W Power supply

5.4.3 NETWORK SOFTWARE

Like any other computer system, a network needs software to run and perform all the functions it is designed for. In a network environment three types of softwares are employed. These are the systems software, the network software, and the application software.

The networkable system software, like any other systems software operated in a stand alone machine, permits users to interact with hardware and manages other software to operate using the host hardware. Networkable versions of DOS 6.2 or equivalent and Windwos for Workgroups 3.11 are the operating systems recommended by the Ethiopian Government for

government organizations considering Local Area Network.

The network software, on the other hand, allow the interconnections between applications and performs the complex task of managing the requirements of a number of users to access simultaneously data or devices in the network. There are several network systems software in the market. The Novell netware, available in several versions, which can be installed on almost any network hardware and can operate under DOS, is the one recommended by the Ethiopian Government for all network environments.

The third component of network software is the application software. Application software covers the networkable versions of program or programs designed to carry out specific task of users in the network environment. The main focus for the network application software by the Department is the networkable versions of database management systems which will be accessible to multi-users from different workstations located at both the head office and Bole airport.

5.4.4 DISK MIRRORING

The nature of the immigration and consular work requires that the system must operate on a continuous basis. Although restoration can be made from backups, delays that may occur due to system failure are totally unacceptable to any passenger who has arranged a flight.

Therefore the network system to be acquired must provide a way to ensure network survivability if components fail. One way of providing continuous real time backup is the

use of hard disk mirroring equipment. This secondary disk duplicates the contents of the primary drive and automatically takes over if the primary drive fails and can be used to establish a new primary disk without data loss or interruption of services.

5.4.5 SECURITY

As mentioned time and again, the Department maintains sensitive data about the movement of persons into and out of the country. These alone call for special security consideration. The need for tight security control, however, becomes much more important in a network environment.

Therefore, the network system must provide sophisticated and reliable password security system which limits unauthorized access to directories and files maintained in the central server(s). It should prevent users from logging into workstations other than those to which they are assigned. The restriction should also include work session where no user may be allowed to login into the system after the permitted time.

5.4.6 BACKUP SYSTEMS

The network system must incorporate a backup system from the start to copy regularly the contents of the file server(s). There are a number of ways to back up the system including tape backup systems, optical systems and removable disk systems. In considering backup system, government policy prescibes to pay special attention to capacity, data transfer rate, access time, interface (parallel, SCSI, proprietary), physical cartidge size (standard/non-

standard), recording format (cartiridge interchangability, compatibility) etc.

5.4.7 POWER REQUIREMENT

Both the workstations and the server(s) need uninterruptible power supply, so that users continue their activities without interruption. The amount of time through which the UPS (Uninterruptible Power Supply) or any other power supply will continue to operate is an important consideration. Although serious power interruption has never been encountered in the Capital, it is necessary to install an equipment that can provide continuous power supply to ensure smooth operation of the system even under complete power breakdown.

5.4.8 EXISTING EQUIPMENT

In determining the requirements for a network system, it is important to identify existing equipment and assess its limitations.

As described in Chapter, 2 section 2.2, although limited in capacity and application, there are existing software and hardware at the head office and the Immigration branch office at Bole.

Therefore it is essential to ensure that the hardware to be acquired for the network system will not only satisfy the application requirements of the Department, but also it is compatible with some of the existing equipments to be retained for use by the new system, particularly with the microcomputers, and must be able to operate on other machines that might be obtained from different suppliers.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The systems analysis and design exercise reported in this study aimed at examining the existing Immigration and Consular service in Ethiopia, identifying its major shortcomings, defining requirements of the system, and then proposing and designing an improved system that would solve problems prevailing in the existing system through the application of modern information technology.

With this objective in mind, a thorough examination of the existing system has been carried out using different data collection techniques to determine what is being done by the system and how it is being done, the volume of transactions, and the existing problems and their underlying causes. The outcome of this investigation has revealed that the existing manual and paper-based Immigration and consular service is slow, inefficient and prone to many kind of errors.

It has been found out that with the existing inefficient manual and paper based system, it is becoming increasingly difficult for the Department to deal with the large number of requests for travel documents as well as to store, maintain and manipulate the colossal amount of data related to issued Passports, Visas and Residence Permits.

Since multiple Passport, Visa and Residence Permit files are created by different sections and maintained at different places, they cannot be accessed and retrieved easily for the purpose of checking, updating, correcting, and deleting records. It is time consuming and at times frustrating for the users to go through the large volume of paper cards and files to locate the record of a particular applicant requesting Passport or Visa.

Due to this, it is not that difficult these days for any Ethiopian to take more than one valid Passport form the Department by the same name, leaving aside those that are taking out the same under fictitious identity.

In order to solve these and other problems identified during analysis of the existing system, logical components of the present system that would serve as a basis for the new system have been extracted and modelled independent of the current organizational structure of the Department.

Based on the logical model of the system as well as on the newly identified requirements, the advantage and disadvantages of different ways of organizing the new system are evaluated. In line with the application requirements of the Department, one design option, known as distributed system, is recommended and further defined in terms of its input, output, processing, control and security requirements.

To determine what kind of data should be held by the new system, entities about which the Department maintains information and the relationship that exists between these entities have also been examined. Furthermore, data items that need to be maintained by the system

about each entity are identified and how these data items are going to be held in the computer database are analyzed by applying tools and techniques of relational data modelling.

At the physical design stage, initial models of the proposed system incorporating two prototype databases - the Watch List and the Passport - have been designed using the standard CDS/ISIS database design module. To demonstrate performance of the prototype system application program has also been developed using CDS/ISIS Pascal interface for one subsystem, i.e., the issue of new Passport. Although only one subsystem has been physically designed, the experience shows that prototypes for the other subsystems could also be designed along the same line without much difficulties.

Further, the input forms are also redesigned by removing entries not required by the new system but that incorporate new data elements that have been identified as essential during the analysis. In addition to these, sample user-computer interface is designed emphasizing the need for user friendly computer system. Finally, some basic application requirements and policy considerations for networking and software and hardware selection and acquisition have been outlined for the proposed system.

During the data collection process an excellent relationship was established between the analyst and the users at different level, and every effort has been made, to investigate their dissatisfaction with the existing system. Their views about the structure of the proposed system have also been considered as much as possible.

The study doesn't, however, claim any thing beyond preliminary analysis and design of a proposal for computer-based Immigration and Consular system that should be evaluated, tested and developed before full-scale implementation is considered and resource is committed.

6.2 RECOMMENDATIONS

For the successful implementation of an information system, gaining management and user commitment to the project and to any changes necessitated by the new system are always important.

The prototype system developed for checking and processing requests for a new Passport has been demonstrated to the Management of the Department as well as higher officials at the parent organization, i.e., the Ministry of Internal Affairs. Since the initial model of system developed and demonstrated to the officials was an attempt to convince them how a computer-based system can solve their problems, a very stimulating response has been obtained. From this initial model the management has expressed its interest for full scale study to implement the proposed system. In light of these facts, and recommendation of the committee (see section 1.5), the analyst feels that there is a necessary organizational commitment for the new system to be accepted and implemented appropriately.

The software chosen for physical design and development of one of the subsystems is not the best software for the system. Nevertheless it has enabled to show how the system would

perform if the analysis of the logical design of the various subsystems are carefully translated into the physical design and development of the system.

It is therefore recommended that a large-scale RDBMS software is to be chosen for proper development of all the subsystems and their implementation in a real life situation.

In order to determine the technical and financial feasibility of the proposed system, it is necessary to set up a project implementation team comprising professionals and users, in which the present analyst can also be a member. Since the Department has no qualified personnel with the necessary skill and technical know how to evaluate and implement the proposed system, professionals available elsewhere in the other branches of the Ministry and an external consultant in Local Area Network should form the team. The project implementation team will be responsible, among other things, for :

- conducting detailed cost-benefit analysis for the proposed system;
- Evaluation, revision and ,if deemed it necessary, modification of requirements of the proposed system;
- Collecting and analyzing the necessary information required to install the proposed Local Area Network to determine thesize of the central server, the number, type and location of workstations required at the head office and Bole airport; and
- Conduct detailed survey of the Local Area Network hardware and software based on requirements of the Department and the minimum recommended system configuration discussed in section 5.4.

Based on this, invitation for tender should be prepared and circulated to suppliers covering the context in which the new system is going to operate, the functions which it performs, the proposed time scale of implementation, the performance criteria that will have to be met in terms of volumes of transactions, data handling facilities, output required, etc. Since the purchase of hardware and software will have significant financial implication on the Department, the process of evaluation should involve preparation of specifications, obtaining vendor proposals and evaluation of the proposal.

Conversion from the old system to the new can be accomplished in several ways. The Immigration and consular Main Department, however, is too broad in scope and is so large that the new system cannot be implemented all at once. Furthermore, the level of skill of users and the necessary manpower required to operate the new system is not adequate. In light of these constraints, implementation should be handled more easily and phase by phase where one portion of the system is converted at a time.

Phased replacement is the most effective method of changing over to the new system since it gives chance to the users at the Department to become familiar with the new system. It also allows to correct errors quickly before they are able to cause catastrophic failure, and as compared to parallel running, in which the old and the new system are operated side by side, phased replacement is less expensive and offers flexibility in budget allocation..

In taking the decision about the phased-in implementation strategy, it would be essential to give priority to the aspects of the system that are more important which need immediate action.

Therefore, the subsystem for controlling the movement of person against whom travel restriction has been filed by the court of competent jurisdiction should be converted first, followed by the subsystem for processing and issuing Passport and Visa to Ethiopian nationals.

Once this is done, the Watch List Files should be loaded at Bole airport and the workstations be connected to the head office to monitor incoming and outgoing passengers. After the parts of the system for processing and issuing Passport and Visa for Ethiopian nationals are successfully implemented, subsystems which maintain information on resident and non-resident foreigners can be implemented one after another.

The new computer-based Immigration and Consular system cannot be used until all the data files are converted into a computer-usable form. When a manual system is computerized, file conversion is usually the most expensive and time consuming task. Although it is not complete and doesn't consist all the data elements required by the proposed system, the computer unit has already started the file conversion process beginning form 1991/92.

In order to cope with the huge number of new Passports and visa being issued every year, management of the Department has recently decided that the computer unit start converting the files on issued passports and visas from the current year (the main purpose of the file conversion process being carried out by the computer unit is to provide users with offline service for checking applicant's detail before a request for a Passport or a Visa is processed).

Another major consideration during the implementation stage is educating and training of users. Staff training in the use of the system is as important as the system itself. Without the necessary knowledge for effective operation at all levels computer systems can be expensive waste of resources in any organization.

Since the existing professional manpower available in the Department is not adequate, and the majority of users are not familiar with data processing environment, extensive education and training is required to implement the new system. In this regard system operators, programmers, input operators that can run, operate, and maintain the system are some of the areas that the training program need to cover.

The type of training, type and number of users to be trained, the duration of training, training procedures, places and source of training and the cost of training can be prepared and decided later during the actual implementation stage.

Finally, the analyst wishes to emphasize that unless a uniform policy is adopted and an agency is set up that will be responsible for issuing identity cards to nationals, even the design and implementation of the most elegant computer-based Immigration System can be a wasteful effort. The proposal submitted to the government regarding the establishment of such an institution should therefore be approved and implemented as early as possible.

GLOSSARY

The following terms and concepts are used throughout the study.

Passport: a formal document issued by a competent government body to a citizen of a country that certifies to the identity and citizenship of the bearer and allows him to travel within the borders of a foreign country when it has been endorsed with a Visa by an authorized official of that country.

Visa: an endorsement made on a Passport by the proper authorities(as of the country the bearer wishes to enter) denoting that it has been examined and that the bearer is permitted to proceed.

RESIDENT-FOREIGNER: any foreigner who has established a fixed dwelling in Ethiopia to which he returns from time to time, irrespective of whether or not he maintains a fixed dwelling in another country.

RESIDENCE PERMIT: a formal document issued by the Immigration and Consular Main Department to a non-diplomatic foreigner which enables him to dwell in Ethiopia and which shall remain valid for a period of one year from the date of his/her registration.

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APPENDIX A : EXISTING PASSPORT, VISA AND RESIDENCE PERMIT APPLICATION FORMS

==========

- Applicant's Name in Full .....

- Previous Passport Number .....

- Type of Travel Document and/or Visa Requested

. Passport only [ ] . Passport & Visa [ ] . Visa only [ ]

. Laissez-Passer only [ ] . Laissez-Passer & Visa [ ]

- Visa requested for ..... Month/year .Multiple [ ] Single [ ]

- Occupation .....

- Domicile.....Town.....Region.....Worada.....Kebele.....
H.No....Tel.....

(entries below not to be filled by visa applicants)

- Place & Date of Birth.....

- Height.....

- Colour of Eye.....

- Colour of Hair.....

- Identifying Detail.....

Children Travelling With	Date of Birth	Nationality
1 ----------	----------	----------
2 ----------	----------	----------
3 ----------	----------	----------

Date.....

Signature.....

Note : The Application Form must be filled clearly

Form 1 Ethiopian's Passport and Visa Application Form

For office use only

To be Filled by Reception Officers

1.Type of Travel Document/Visa Permitted.....

.....

2. Reception clerk name .....

Signature.....

Date.....

To be filled by Passport Officers

1. Passport number given to the applicant.....

2. Passport valid from..... Until.....

3. Date & year Passport written.....

4. Name of the Passport writer.....

Signature.....

To be filled by Visa Officers

1. Visa number.....

2. Visa valid from..... Until.....

3. Type of visa.....

4. Special remark.....

5. Name of visa registrar .....

Signature..... Date.....

Form 1 (continued)

Full name.....

Passport/Laissez-Passer number.....

Domicile.....Reg..... Worada..... Kebele.....
House no....Tel .....
- Passport or Laissez-Passer to be replaced with

Passport [ ] Laissez-Passer [ ]

- If the request is Passport correction, write down

the type of correction to be made.....

- Renewal of Passport [ ]

- Requested with Visa[ ] Without Visa[ ] Extension of Visa[ ]

- Visa requested for ... Month/year Multiple [ ] Single [ ]

Applicant's signature..... Date.....

For office use only

To be filled by Reception officers

1.Type of Travel Document/Visa permitted.....

2. Reception clerk name .....

Signature.....
Date.....

To be filled by Visa officers
1. Visa number.....

2. Visa valid from..... Until.....

3. Type of visa.....

4. Special remark.....

5. Name of visa registrar .....
Signature..... Date.....

Form 2 Passport/Laissez-Passer Renewal, Replacement and Correction Form

- Full name.....

- Passport/Laissez-Passer number.....

- Visa number.....

- Date Visa issued.....

Applicant's signature.....

Date.....

For office use only

To be filled by Reception Officers

1. Type of Travel Document/Visa permitted.....

.....

2. Reception clerk name .....

Signature.....

Date.....

To be filled by Visa officers

1. Visa number.....

2. Visa valid from..... Until.....

3. Type of visa.....

4. Special remark.....

5. Name of visa registrar .....

Signature..... Date.....

Form 3 Visa Extension Application Form (for Ethiopian nationals)

- Name or name in full.....
- First name .....
- Nationality .....
- Nationality by birth.....
- Year of Birth .....
- Place of Birth .....
- Country of Birth.....
- Marital Status ....
- Occupation.....
- Occupation before entering to Ethiopia.....
- Port of arrival .....
- Date of arrival .....
- Passport number.....
- Date passport issued.....
- Date passport expires.....
- Visa number
- Visa Type.....
- Place visa issued .....
- Date visa issued.....
- Reason for Residence.....
- Expected Duration of stay in Ethiopia.....
- Occupation in Ethiopia .....
- Work capital or Salary .....
- Working place.....
- Tel.number of working place.....
- License/Work Permit number.....
- License/Work Permit Valid until.....
- License/Work Permit Issued by.....
- Residence Address :

. Region..... Worada..... Kebele..... House No..... Tele.No.....

- Name and Nationality of spouse :

. Name (in full as it appears on the passport)..... .

Nationality.....

. Occupation.....

- Children without own passport and identity.....

. Name ..... Nationality.....

. " ..... " .....

- Have you been to Ethiopia before? Yes..... No..... ..

- If yes, from..... Until.....

- previous residence Address R.....W.....K.....H.No.

- Previous Occupation .....

- Previous Working place/organization..... Date .....

Applicant's signature.....

Form 4 Residence Permit Application form

FOR OFFICE USE ONLY

TO BE FILLED BY RECEPTION SECTION

- Personal Description :
  . Height.....
  . Eye Colour.....
  . Hair Colour.....
  . Other Distinguishing Marks.....

Date..... Signature.....

TO BE FILLED BY FOREIGNERS REGISTRATION SECTION

- Residence permit accepted or rejected.....
  .....
  .....
  Date..... Signature.....

- Residence permit issued until.....

- Identity Card number .....

Date..... Signature.....

Form 4 (continued)

- Identity card number.....
- Family name or name in full.....
- First name.....
- Nationality.....
- Date of birth.....
- Residence Address :
  - . Region.....
  - . Worada.....
  - . Kebele.....
  - . House number.....
  - . Telephone number.....
- Previous occupation .....
- Present occupation.....
- Present working place.....
- Tel. number of present working place.....
- License/work permit number.....
- Work capital or salary last year.....
- Work capital or salary this year.....
- Passport number.....
- Passport issued by.....
- Passport expires on.....
- Children without own identity card.....
- Children date of birth.....
- Children who received residence permit after entering Ethiopia:

Name Date/birth Nationality Passport no Issued by Expires on

" " " " " "

- Changes to be reported on personal or family since the last given residence permit.....

.....

Date..... Applicant's signature.....

Form 5 Residence Permit Renewal Application Form

FOR OFFICE USE ONLY

Residence Permit extended until.....

Date..... Signature.....

Remark.....

Extension of Residence Permit stated on Identity Card

Date..... Signature.....

Extension of Residence Permit noted on card

Date..... Signature.....

Head Office informed on extension of Residence permit

Date..... Signature.....

Form 5 (continued)

- Applicant's name in full.....

- Date of birth..... Nationality.....

- Passport No..... Valid until .....

- No. Persons travelling on the same Passport.....

- Domicile.....Reg..... W..... K..... H.No....Tel.....

- Residence Permit Number..... Valid until.....

- Type of Visa requested Re-entry [ ] Multiple [ ]

- Exit permit [ ]

- Visa requested for ..... Day(s)/month(s)
Date.....Applicant's signature... ...

for office use only

To be filled by Reception Officers

1.Type of Travel Document/Visa Permitted.....

2. Reception clerk name .....

Signature.....

Date.....

To be filled by Visa Officers

1. Visa number.....

2. Visa valid from..... Until.....

3. Type of visa.....

4. Special remark.....

5. Name of visa registrar .....
signature..... Date.....

Form 6 Visa Application Form for Resident Foreigners

- Applicant's name in full.....

- Date of birth..... Nationality.....

- Passport No..... Passport type.....Valid until.....

- No. Persons travelling on the same Passport.....

- Date of entry..... Type of Visa used to enter....

- Visa Extension requested for.....Day(s)/month(s)

- Port of Exit(if by land).....

Date.....Applicant's signature.....

For office use only

To be filled by Reception Officers

1.Type of travel document/visa permitted.....

.....

2. Reception clerk name .....

Signature.....

Date.....

to be filled by visa officers

1. Visa number.....

2. Visa valid from..... Until.....

3. Type of visa.....

4. Special remark.....

5. Name of visa registrar .....

signature..... Date.....

Form 7 Visa Extension Application Form by Non-Resident Foreigner

APPENDIX B : FEES PAYABLE FOR PASSPORT, VISA AND RESIDENCE PERMIT

==========

Table 1

FEES PAYABLE IN BIRR FOR ISSUANCE OF TRAVEL DOCUMENTS TO NATIONALS IN ETHIOPIA

N0.	Type of Travel Document	Service Fee		
		Issuance	Renewal	Replacement
1.	Ordinary Passport a) Non-students b) Students	 200 100	 125 63	 240 120
2.	Laissez-Passer a) Ordinary b) Special	 85	 60	 -
3.	Emergency Travel Document	160	60	-

Source : Negarit Gazeta No. 86, May 1994

Table 2

FEES PAYABLE IN BIRR FOR EXIT VISA ISSUED TO ETHIOPIAN NATIONALS

	Type of Visa	Service Fee	
		Issuance	Extension
1.	For one month a) Non-students b) Students	 65 33	 65 33
2.	For three months a) Non-students b) Students	 150 75	 150 75
3.	Multiple Visa a) For three months b) For six months d) For one Year	 300 500 800	 -- -- --

Source : Negarit Gazeta No. 86, May 1994

Table 3

FEES PAYABLE IN BIRR FOR RESIDENCE PERMIT ISSUEDAND OTHER SERVICES GIVEN TO FOREIGN NATIONALS RESIDENT IN ETHIOPIA

NO.	Type of Service	Service Fee		
		Issuance	Renewal	Replacement
1.	Residence Permit issued to nationals of			
	a) Western Europe and other countries	900	675	945
	b) Eastern and central European countries	800	600	840
	c) Middle East countries	700	525	735
	d) Asian countries	600	450	630
	e) Latin and Central American & Caribbean countries	500	375	525
	f) African country	400	300	420
2.	Notice of change of business or Residence	298		

Source : Negarit Gazeta No. 86, May 1994

Table 4

FEES PAYABLE IN BIRR FOR RE-ENTRY VISA ISSUED FOREIGN NATIONALS RESIDENT IN ETHIOPIA

	Type of Visa	Service Fee	
		Issuance	Extension
a)	For three months	210	594
b)	For six months	420	774
c)	For one Year	840	1134
d)	Multiple Visa for three months	354	
e)	Multiple Visa for six months	554	
f)	Multiple Visa for one year	854	

Source : Negarit Gazeta No. 86, May 1994

Table 5

FEES PAYABLE IN BIRR FOR VISA EXTENSION TO NON-RESIDENT FOREIGNERS

Type of Service	Tourist Visa		Business Visa	
Visa issue/extension to nationals of :-	Issue	Extension	Issue	Extension
a) Western Europe and other country	315	236	325	244
b) Eastern and Central European countries	280	210	290	218
c) Middle East countries	245	184	255	191
d) Asian Countries	210	158	220	165
e) Latin & central American & Caribbean countries	175	131	185	139
f) African countries	140	105	150	113

Source : Negarit Gazeta No. 86, May 1994

Table 6

FEES PAYABLE IN BIRR FOR ENTRY VISA ISSUED TO FOREIGNERS AT PORTS OF ENTRY

Nationals of	Fee
a) Western Europe and other country	335
b) Eastern and Central European countries	300
c) Middle East countries	265
d) Asian Countries	230
e) Latin & central American & Caribbean countries	195
f) African countries	160

Source : Negarit Gazeta No. 86, May 1994

APPENDIX C : ENGLISH EQUIVALLENTS OF AMHARIC LETTERS
FOR INTERNAL USAGE ONLY

ሀ	ሁ	ሂ	ሃ	ሄ	ህ	ሆ
Ha	Hu	Hi	Ha	Hie	H	Ho
ለ	ሉ	ሊ	ላ	ሌ	ል	ሎ
Le	Lu	Li	La	Lie	L	Lo
ሐ	ሑ	ሒ	ሓ	ሔ	ሕ	ሖ
Ha	Hu	Hi	Ha	Hie	H	Ho
መ	ሙ	ሚ	ማ	ሜ	ም	ሞ
Me	Mu	Mi	Ma	Mie	M	Mo
ሠ	ሡ	ሢ	ሣ	ሤ	ሥ	ሦ
Se	Su	Si	Sa	Sie	S	So
ረ	ሩ	ሪ	ራ	ሬ	ር	ሮ
Re	Ru	Ri	Ra	Rie	R	Ro
ሰ	ሱ	ሲ	ሳ	ሴ	ስ	ሶ
Se	Su	Si	Sa	Sie	S	So
ሸ	ሹ	ሺ	ሻ	ሼ	ሽ	ሾ
She	Shu	Shi	Sha	Shie	Sh	Sho
ቀ	ቁ	ቂ	ቃ	ቄ	ቅ	ቆ
Ke	Ku	Ki	Ka	Kie	K	Ko
በ	ቡ	ቢ	ባ	ቤ	ብ	ቦ
Be	Bu	Bi	Ba	Bie	B	Bo
ተ	ቱ	ቲ	ታ	ቴ	ት	ቶ
Te	Tu	Ti	Ta	Tie	T	To

ቸ	ቹ	ቺ	ቻ	ቼ	ች	ቾ
Che	Chu	Chi	Cha	Chie	Ch	Cho

ኀ	ኁ	ኂ	ኃ	ኄ	ኅ	ኆ
Ha	Hu	Hi	Ha	Hie	H	Ho

ነ	ኑ	ኒ	ና	ኔ	ን	ኖ
Ne	Nu	Ni	Na	Nie	N	No

ኘ	ኙ	ኚ	ኛ	ኜ	ኝ	ኞ
Gne	Gnu	Gni	Gna	Gnie	Gn	Gno

አ	ኡ	ኢ	ኣ	ኤ	እ	ኦ
A	U	I	A	E	E	O

ከ	ኩ	ኪ	ካ	ኬ	ክ	ኮ
Ke	Ku	Ki	Ka	Kie	K	Ko

ኸ	ኹ	ኺ	ኻ	ኼ	ኽ	ኾ
He	Hu	Hi	Ha	Hie	H	Ho

ወ	ዉ	ዊ	ዋ	ዌ	ው	ዎ
We	Wu	Wi	Wa	Wie	W	Wo

ዐ	ዑ	ዒ	ዓ	ዔ	ዕ	ዖ
A	U	I	A	E	E	O

ዘ	ዙ	ዚ	ዛ	ዜ	ዝ	ዞ
Ze	Zu	Zi	Za	Zie	Z	Zo

ዠ	ዡ	ዢ	ዣ	ዤ	ዥ	ዦ
Je	Ju	Ji	Ja	Jie	J	Jo

የ	ዩ	ዪ	ያ	ዬ	ይ	ዮ
Ye	Yu	Yi	Ya	Yie	Y	Yo



De Du Di Da Die D Do



Je Ju Ji Ja Jie J Jo



Ge Gu Gi Ga Gie G Go



Te Tu Ti Ta Tie T To



Che Chu Chi Cha Chie Ch Cho



Pe Pu Pi Pa Pie P Po



Tse Tsu Tsi Tsa Tsie Ts Tso



Tse Tsu Tsi Tsa Tsie Ts Tso



Fe Fu Fi Fa Fie F Fo



Pe Pu Pi Pa Pie P Po



Ve Vu Vi Va Vie V Vo


Lua Mua Sua Rua Sua Shua Kua
Bua Tua Chua Hua Nua Gnua Zua
Jua Dua Jua Tua Chua Pua Tsua Fua
Ko Go Ko Ho Ku Gu Ku Hu

APPENDIX D: SAMPLE FIELD DEFINITION TABLE (FDT), FIELD SELECT TABLE (FST), DATAENTRYWORKSHEET, DISPLAY FORMAT

Field Definition Table (FDT) Database: Watch

?	Tag	Name	Len	Typ	Rep	Delimiters/Pattern
-	1	WATCH LIST RECORD	1	X		
-	5	PERSONAL NAME	15	A		
-	15	FATHER'S NAME	15	A		
-	25	GRAND FATHER'S NAME	25	A		
-	35	OCCUPATION	20	X		
-	45	REGION	10	X		
-	55	TOWN	10	X		
-	65	WORADA	10	X		
-	75	KEBELE	02	X		
-	85	HOUSE NUMBER	05	X		
-	95	RESTRICTION REF. NO	07	X		
-	105	REQUESTED BY	25	X		
-	115	REQUESTED ON	06	X		
-	125	REQUESTED UNTIL	06	X		
-	135	REASON FOR RESTRICTION	35	X		

WATCH LIST DATA ENTRY WORKSHEET

PERSONAL NAME _____

FATHER'S NAME _____

GRAND FATHER'S NAME_____

OCCUPATION_____

REGION _____ TOWN_____WORADA_____

KEBELE _____ HOUSE NUMBER_____

RESTRICTION REF. NO_____ REQUESTED BY_____

REQUESTED ON_____REQUESTED UNTIL_____

REASON FOR RESTRICTION_____

Data Base Name: WATCH FST for Inverted File FST name: WATCH

ID	IT	Data extraction format
- 5	0	v5
- 15	0	v15
- 25	0	v25
- 95	0	v95
-105	0	v105

Field Definition Table (FDT) Database: PASSDB

?	Tag	Name	Len	Typ	Rep	Delimiters/Pattern
-	1	PERSONAL DATA ENTRY W/S	2	X		
-	2	PASSPORT DATA ENTRY W/S	2	X		
-	10	FILE NUMBER	10	X		
-	5	PERSONAL NAME	15	A		
-	15	FATHER'S NAME	15	A		
-	25	GRAND FATHER'S NAME	25	A		
-	20	BIRTH DATE	08	N		
-	30	BIRTH PLACE	10	X		
-	40	DOMICILE	10	X		
-	45	REGION	10	X		
-	55	TOWN	10	X		
-	65	WORADA	10	X		
-	75	KEBELE	02	X		
-	85	HOUSE NUMBER	05	X		
-	50	TELE. NUMBER	08	N		
-	60	ID NUMBER	08	X		
-	70	ID ISSUED BY	15	X		
-	35	OCCUPATION	20	X		
-	80	HEIGHT	04	X		
-	90	EYE COLOUR	06	A		
-	100	HAIR COLOUR	06	A		
-	110	SPECIAL MARK	10	A		
-	120	PASSPORT NUMBER	10	X		
-	130	PASSPORT ISSUE DATE	08	P		99-99-99
-	140	PASSPORT EXPIRY DATE	08	P		99-99-99
-	150	PASSPORT STATUS	01	A		
-	155	PASSPORT STATUS DATE	08	P		
-	160	PASSPORT ISSUED BY	30	X		
-	170	PASSPORT ISSUE PLACE	15	A		
-	180	PASSPORT REMARK	60	X		
-	190	NAME OF CHILD	15	A		
-	200	BIRTH DATE OF CHILD	08	N		

PERSONAL DATA ENTRY WORKSHEET

FILE NUMBER_____
PERSONAL NAME _____ FATHER'S NAME _____

GRAND FATHER'S NAME_____ BIRTH DATE_____ BIRTH PLACE_____

DOMICILE Ethiopia REGION_____ TOWN_____ WORADA _____

KEBELE _____ HOUSE N0. _____ TELE. NO. _____ ID NUMBER_____

ID ISSUED BY _____ OCCUPATION_____

HEIGHT _____ EYE COLOUR_____ HAIR COLOUR_____ SPECIAL MARK_____

NAME OF CHILD_____ BIRTH DATE OF CHILD_____ NATIONALITY OF CHILD Ethiopian

PASSPORT DATA ENTRY WORKSHEET

PASSPORT NUMBER _____

PASSPORT ISSUE DATE 99-99-99 PASSPORT EXPIRY DATE 99-99-99

PASSPORT ISSUED BY Ministry of Internal Affairs PASSPORT ISSUE PLACE Addis Ababa

PASSPORT STATUS A PASSPORT STATUS DATE _____

PASSPORT REMARK _____

Data Base Name: PASSDB FST for Inverted File FST name:PASSDB

ID	IT	Data extraction format
- 10	0	V10
- 5	0	v5
- 15	0	v15
- 25	0	v25
- 120	0	V120
- 150	0	V150
- 130	0	V130
- 140	0	V140

WATCH LIST DISPLAY FORMAT

Please enter/edit format(@xxxxx to use predefined format)
C20,'LIST OF PERSONS IN THE WATCH LIST DATABASE'#C20,'==========
==========='##,C5,'PERSONAL NAME : 'V5#, C5,'FATHERS''S NAME : 'V15#C5,'GRAND FATHER''S NAME : ' V25#C5,'OCCUPATION : 'V35###,C10, 'ADDRESS',C40,'RESTRICTION INFORMATION'#C10,'==========='C39,'==========
==========='##C5,'REGION : 'V45,C40,'REF. NO :'V95/C5,'TOWN : 'V55,C40,'REQUESTED BY : 'V105/C5,'WORADA :'V65,C40, 'REQUESTED ON : 'V115/C5,'KEBELE : ' V75,C40,'REQUESTED UNTIL : 'V125/C5'HOUSE NO. : 'V85,C40'REASON : 'V135#####

PASSPORT DISPLAY FORMAT

Please enter/edit format(@xxxxx to use predefined format)
C20, "LIST OF EHTIOPIAN PASSPORT HOLDERS"#//,"PERSONAL NAME :"C28,V5/C3,"FATHERS'S NAME :"C28,V15/C3"GRAND FATHER'S NAME :",C28,V25/C3,"OCCUPATION :"C28,V35/C3"ID NUMBER :"C28,V60/C3,"BIRTH DATE :"C28,V20/C3,"BIRTH PLACE :" C28,V30/C3,"DOMICILE :"C28,V40/C3,"REGION :"C28,V45/C3, "TWON :"C28,V55/C3,"WORADA :"C28,V65/C3, "KEBELE :"C28,V75/C3,"HOUSE NO. :"C28,V85/C3,"TELE NUMBER :" C28,V50##C3,"PASSPORT NUMBER :"C28,V120/C3,"PASSPORT ISSUE DATE :"C28, MDU,V130/C3,"EXPIRY DATE :"C28,MDU, V140/IF V150 :'L' OR V150 :'V'OR V150 :'V' OR V150 :'W' THEN C3,"PASSPORT STATUS :"C28,V150/C3."PASSSPORT STATUS DATE :"C28,V155/FI#

APPENDIX E : SOURCE CODE FOR ICDDES

```
program ICDDES;
Var
dd,s,choice,choice1,choice2,nam,pnam, fnam, gfnam,pnam1,fnam1,gfnam1 :string;
rc,x,x1,s3,s1,s2:real;

procedure WELCOME(x,y,h,w: real);

  var
    m,n,i,o,j,k,l,c: real;
    strq : string;

  begin
  clear;
  m :=0;
  n:=0;
    repeat
     cursor(y,x-m);
     write('=');
     cursor(y,x+m);
     write('=');
     cursor(y+1,x-m);
     write('=');
     cursor(y+1,x+m);
     write('=');
     m := m + 1;
   until m = w;
   cursor(y,x-w);
   write('╒');
   cursor(y,x+w);
   write('╕');
   cursor(y+1,x-w);
   write('╘');
   cursor(y+1,x+w);
   write('╛');
   repeat
      cursor(y+1+n,x-w);
      write('│                                                    │');
      cursor(y+1+n,x-w+1);
      write('                                                    ');
      cursor(y+2+n,x-w);
      write('╘                                                    ╛');
      cursor(y+2+n,x-w+1);
      write('════════════════════════════════════════════════════');
       cursor(y+1+n,x+w+1);
       write('  ');
     n := n +1;
     if n = h then
        begin
          cursor(y+1+h,x+w+1);
          write('  ');
        end;
   until n = h;
   cursor(y+2+h,x-w+2);
   write('                                                    ');
   Cursor(7,18);
   Writeln('IMMIGRATION AND CONSULAR MAIN DEPARTMENT');
```

```
        cursor(9,33);
        writeln('WELCOME ');
        Cursor(11,35);
        writeln('TO');
        cursor(15,21);
        writeln('IMMIGRATION DATA ENTRY SERVICE');
        cursor(22,5);
        writeln('Press any key to continue');cursor(22,32);
        c := kbdkey(strq);
      end;

  FUNCTION CHECK : string;
   Var
   cnt, cnt1 : real;
   pw, had:string;
   begin
   clear;
   box(5,4,14,55,2);
   Cursor(6,11);
   Writeln('IMMIGRATION AND CONSULAR MAIN DEPARTMENT');
   cursor(10,10);
   write('Enter User Password');
   cnt:=0;
   cnt1:= 0;
   had:= '';
   pw := '';
   repeat
   cnt := 0;
   had:= '';
   cursor(10,28);
   repeat
     cursor(10,28 + cnt);
     attr(' ',5,10,32+cnt,6); pw := inkey;
     uc(pw);
     had:= had | pw;
     cnt:= cnt + 1;
     cursor(14,40);
     until (pw = '' ) or (cnt = 6);
     cnt1:=cnt1+1;
     if had < > 'KHZFM5' then
       begin cursor(12,25); writeln(Chr(7),'Invalid Password');
       cursor(14,20); write('Please, try again !');end;
  until (had ='KHZFM5') or (cnt1 > 2);
  if had= 'KHZFM5' then check := 'Y'  else check := 'N';
  clear;
  box(5,5,14,55,2);
  cursor(8,22); write(' UNAUTHORIZED USER !');
  cursor(11,22); write('You Are Denied Access');
  cursor(13,21); write('To The Data Entry Service');
end;

PROCEDURE MAIN;

BEGIN
  clear;
  box(1,2,21,70,2);
  clearbox(2,4,19,66,1);
  cursor(3,14);
```

```
  write('IMMIGRATION AND CONSULAR MAIN DEPARTMENT');
  cursor(4,4);
  write('═══════════════════════════════════════════════════════');
  cursor(6,28);
  write('DATA ENTRY MAIN MENU ');
  chattr(-2,6,26,23);
  cursor(7,4);
  write('═══════════════════════════════════════════════════════');
  cursor(9,15);
  write('A. PASSPORT');
  cursor(11,15);
  write('B. PASSPORT AND VISA');
  cursor(13,15);
  write('C. VISA');
  cursor(15,15);
  write('D. RESIDENCE PERMIT');
  cursor(18,4);
  write('═══════════════════════════════════════════════════════');
  cursor(19,5);write('Press Letter of Choice');chattr(-1,19,5,23);
  cursor(19,43);write('Press <F2> to Quit');chattr(-1,19,43,19);cursor(19,33);

 END;

 Procedure npde;{New Passport Data Entry (NPDE)}
 begin
    clear;
    box(1,8,20,68,2);
    cursor(2,28);
    Write('PASSPORT DATA ENTRY MENU');
    clearbox(-2,12,14,60,1);
    cursor(5,25);
    write('ENTER FULL NAME OF APPLICANT');
    chattr(-2,5,23,30);
    repeat
    CURSOR(8,18);
    write('PERSONAL NAME        :'); cursor(8,43);
    readln(pnam);
    until size(pnam) <> 0;
    repeat
    cursor(10,18);
    write('FATHER''S NAME       :'); cursor(10,43);
    readln(fnam);
    until size(fnam) <> 0;
    repeat
    cursor(12,18);
    write('GRAND FATHER''S NAME  :'); cursor(12,43);
    readln(gfnam);cursor(12,53);
    until size(gfnam) <> 0;
    cursor(19,20);
    writeln('Press <CR> to Check for Travel Restriction '); cursor(19,64);readln;
 end;

Procedure msg1;{Produces a message that no matching record is found in the WL database}

begin
 clear;
    box(1,8,18,70,2);
    clearbox(3,12,14,62,1);
```

```
    cursor(4,20);
    write('THERE IS NO RECORD IN THE WATCH LIST DATABASE');chattr(-2,4,20,45);
    cursor(5,26);
    write('THAT MATCHS WITH THE APPLICANT''S :-');chattr(-2,5,26,36);
    cursor(8,25);
    write('PERSONAL NAME :'); cursor(8,48);write(pnam);chattr(4,8,46,10);
    cursor(10,25);
    write('FATHER''S NAME :');cursor(10,48);write(fnam);chattr(4,10,46,10);
    cursor(12,25);
    write('GRAND FATHER''S NAME:');cursor(12,48);write(gfnam);chattr(4,12,46,10);
    cursor(20,10);
    write('Press <C> to Check Previous Passport Record');
    cursor(20,59);
    write('<N> to Quit');
    write(''); cursor(20,72);
    choice1 :=inkey;
    uc(choice1);
end;

Procedure msg2;{Produces a message that no matching record was found in the Passport database}

begin
  clear;
   box(1,8,18,70,2);
   clearbox(2,10,14,66,1);
   cursor(3,20);
   write('THERE IS NO RECORD IN THE PASSPORT DATABASE');chattr(-2,3,20,43);
   cursor(4,25);
   write('THAT MATCHS WITH THE APPLICANT''S :');chattr(-2,4,25,36);
   cursor(8,25);
   write('PERSONAL NAME :'); cursor(8,48);write(pnam);chattr(4,8,46,10);
   cursor(10,25);
   write('FATHER''S NAME :');cursor(10,48);write(fnam);chattr(4,10,46,10);
   cursor(12,25);
   write('GRAND FATHER''S NAME:');cursor(12,48);write(gfnam);chattr(4,12,46,10);
   cursor(18,22);
   write('Do you want to create a new record <Y/N> ?'); chattr(1,18,22,41); cursor(18,64);
end;

Procedure chkwl;
begin

nam:=pnam|'*'|fnam|'*'|gfnam;
autotype(' ');
s1 :=search(nam);
s:=inkey;
s2:=setpos(0,1);
end;

Procedure wlfnd;
 VAR
  ans :string;

 Procedure show;
 var
  occup,town,wor,keb,hno,resrno,reqby,reqon,requnt :string;

 begin
```

```
clear;
box(1,5,22,70,2);
clearbox(2,7,19,66,1);
cursor(2,30);
write(chr(7),' WATCHOUT !!');
chattr(4,2,28,15);
cursor(4,20);
write('THIS IS DETAIL WATCH LIST RECORD');
chattr(2,4,20,33);
cursor(5,23);
write('DISPLAY OF THE APPLICANT :-');
chattr(2,5,23,30);
CURSOR(8,10);
write('PERSONAL NAME          ');
cursor(8,42); write(pnam1);
CHATTR(-2,8,40,20);
cursor(9,10);
write('FATHER''S NAME          ');
cursor(9,42); write(fnam1);
CHATTR(-2,9,40,20);
cursor(10,10);
write('GRAND FATHER''S NAME     ');
cursor(10,42); write(gfnam1);
CHATTR(-2,10,40,20);
occup:=field(fieldn(35,1));
cursor(11,10);write('OCCUPATION    ');
cursor(11,42);write(occup);
CHATTR(-2,11,40,20);
town:=field(fieldn(55,1));
cursor(12,10);write('TOWN         ');
cursor(12,42);write(town);
CHATTR(-2,12,40,20);
wor :=field(fieldn(65,1));
cursor(13,10);write('WORADA       ');
cursor(13,42);write(wor);
CHATTR(-2,13,40,20);
keb :=field(fieldn(75,1));
cursor(14,10); write('KEBELE      ');
cursor(14,42);write(keb);
CHATTR(-2,14,40,20);
hno :=field(fieldn(85,1));
cursor(15,10);write('HOUSE NO     ');
cursor(15,42);write(hno);
CHATTR(-2,15,40,20);
resrno :=field(fieldn(95,1));
cursor(16,10); write('RESTRICTION REF. NO  ');
cursor(16,42);write(resrno);
CHATTR(-2,16,40,20);
reqby :=field(fieldn(105,1));
cursor(17,10);write('REQUESTED BY    ');
cursor(17,42);write(reqby);
CHATTR(-2,17,40,20);
reqon :=field(fieldn(115,1));
cursor(18,10); write('REQUESTED ON    ');
cursor(18,42);write(reqon);
CHATTR(-2,18,40,20);
requnt:=field(fieldn(125,1));
cursor(19,10);write('REQUESTED UNTIL   ');
```

```
      cursor(19,42);write(requnt);
      CHATTR(-2,19,40,20);
      cursor(23,5);
      Write('Press <N> to Quit');
      cursor(23,33);
      write('<Y> to Check Previous Passport Record');
      cursor(23,73);
     end;
 begin
  clear;
    s3 := record(s2);
    if s3 = 0 then
     begin

      box(1,2,20,68,2);
      clearbox(2,4,17,64,1);
      cursor(3,28);
      write(chr(7),'WARNING!',chr(7));
      CHATTR(4,3,26,10);
      cursor(5,14);
      write('EXACT MATCH OF FULL NAME EXISTS');CHATTR(-2,5,14,32);
      cursor(6,17);
      write('IN THE WATCH LIST DATABASE');CHATTR(-2,6,17,26);
      cursor(8,14);
      write('Travel Restriction may have been Filed');CHATTR(2,8,13,40);
      cursor(9,17);
      write('Against the following Applicant :-');CHATTR(2,9,17,34);
      cursor(12,13);
      write('PERSONAL NAME          : ');
      pnam1:=field(fieldn(5,1));
      cursor(12,40); write(pnam1);CHATTR(-2,12,38,10);
      cursor(14,13);
      write('FATHER''S NAME         : ');
      fnam1 :=field(fieldn(15,1));
      cursor(14,40); write(fnam1);CHATTR(-2,14,38,10);
      cursor(16,13);
      write('GRAND FATHER''S NAME   : ');
      gfnam1 := field(fieldn(25,1));
      cursor(16,40); write(gfnam1);CHATTR(-2,16,38,10);
      CURSOR(20,15);write('Do you want further details <Y/N> ?');CHATTR(1,20,15,36);
      CURSOR(20,52);
      ans:=inkey; uc(ans);
      If ans ='Y' then
      show;
      choice2 := inkey;
   end;
end;

Procedure chkpassdb;
begin
  nam:=pnam|'*'|fnam|'*'|gfnam;
   autotype(' ');
   s1 :=search(nam);
   s:=inkey;
   s2:=setpos(0,1);
end;
```

```
Procedure passdbfnd;

 Var
  ans: string;

 Procedure show;
 var
  occup,reg,town,wor,keb,hno,telno,pasno,paisd,pasexd,pastt:string;
  begin
    clear;
    box(1,5,22,70,2);
    clearbox(2,9,19,63,1);
    cursor(2,30);
    write(chr(7),' WATCH OUT!!');chattr(4,2,30,12);
    cursor(4,20);
    write('THIS IS DETAIL PASSPORT RECORD DISPLAY');chattr(-2,4,20,38);
    CURSOR(6,13);
    write('PERSONAL NAME                    ');
    cursor(6,48); write(pnam1);chattr(-2,6,46,20);
    cursor(7,13);
    write('FATHER''S NAME                   ');
    cursor(7,48); write(fnam1);chattr(-2,7,46,20);
    cursor(8,13);
    write('GRAND FATHER''S NAME             ');
    cursor(8,48); write(gfnam1);chattr(-2,8,46,20);
    occup:=field(fieldn(35,1));
    cursor(9,13);write('OCCUPATION          ');
    cursor(9,48);write(occup); chattr(-2,9,46,20);
    reg:=field(fieldn(45,1));
    cursor(10,13);write('REGION             ');
    cursor(10,48);write(reg); chattr(-2,10,46,20);
    town:=field(fieldn(55,1));
    cursor(11,13);write('TOWN               ');
    cursor(11,48);write(town);chattr(-2,11,46,20);
    wor:=field(fieldn(65,1));
    cursor(12,13);write('WORADA             ');
    cursor(12,48);write(wor); chattr(-2,12,46,20);
    keb :=field(fieldn(75,1));
    cursor(13,13); write('KEBELE            ');
    cursor(13,48);write(keb);chattr(-2,13,46,20);
    hno :=field(fieldn(85,1));
    cursor(14,13);write('HOUSE NO           ');
    cursor(14,48);write(hno);chattr(-2,14,46,20);
    telno :=field(fieldn(50,1));
    cursor(15,13);write('TELEPHONE NUMBER   ');
    cursor(15,48);write(telno);chattr(-2,15,46,20);
    pasno :=field(fieldn(120,1));
    cursor(16,13); write('PASSPORT NUMBER   ');
    cursor(16,48);write(pasno); chattr(-2,16,46,20);
    paisd :=field(fieldn(130,1));
    cursor(17,13);write('PASSPORT ISSUE DATE ');
    cursor(17,48);write(paisd);chattr(-2,17,46,20);
    pasexd :=field(fieldn(140,1));
    cursor(18,13); write('PASSPORT EXPIRY DATE ');
    cursor(18,48);write(pasexd);chattr(-2,18,46,20);
    pastt:=field(fieldn(150,1));
    cursor(19,13);write('PASSPORT STATUS    ');
    cursor(19,48);write(pastt);chattr(-2,19,46,20);
```

```
    cursor(22,15);
    write('Do you want to continue to create a new record <Y/N> ?');chattr(1,22,14,55);
    cursor(22,70);
  end;

begin
 clear;
  s3 := record(s2);
  if s3 = 0 then
   begin
    box(1,2,20,70,2);
    clearbox(2,4,17,67,1);
    CURSOR(3,30);
    write(chr(7),' HOLD ON !!',chr(7));
    CHATTR(4,3,28,14);
    cursor(5,20);
    write(' EXACT MATCH OF FULL NAME EXISTS');CHATTR(-2,5,20,32);
    cursor(6,23);
    write(' IN THE PASSPORT DATABASE');CHATTR(-2,6,23,25);
    cursor(7,20);
    write('This applicant may be attempting');CHATTR(2,7,20,33);
    cursor(8,22);
    write('To take Passport illegally');CHATTR(2,8,22,27);
    CURSOR(12,13);
    write('PERSONAL NAME          ');
    pnam1:=field(fieldn(5,1));
    cursor(12,40); write(pnam1);
    chattr(-2,12,38,15);
    cursor(14,13);
    write('FATHER''S NAME         ');
    fnam1 :=field(fieldn(15,1));
    cursor(14,40); write(fnam1);
    chattr(-2,14,38,15);
    cursor(16,13);
    write('GRAND FATHER''S NAME    ');
    gfnam1 := field(fieldn(25,1));
    cursor(16,40); write(gfnam1);
    chattr(-2,16,38,15);
    CURSOR(20,15);write('Do you want further details <Y/N>');chattr(1,20,15,34);
    cursor(20,53);
    ans:=inkey; uc(ans);
    If ans ='Y' then
    show;
    choice2 := inkey;
  end;
end;

Procedure neec;{Procdure to create a new record}
 Var
  ans: string;
 begin
    clear;
    box(4,4,8,70,2);
    cursor(6,15);
    Write('Are you sure you want to create a new record ?');
    cursor(8,30);
    Write('Confirm <Y/N>'); cursor(8,45);
    ans:=inkey; uc(ans);
```

```
    If ans ='Y' then
    Begin
     x := create;
     rc :=record(x);
     if rc=0 then
      begin
         update;
         {x1:= recupdif(x);} updif;
         clear;
         box(8,4,12,70,2);
         cursor(12,10);
         write('Inverted file updated');
         cursor(14,30);
         write('Press <CR> ');
         readln;
       end;
      clear;
      box(4,4,8,70,2);
      cursor(6,15);
      write('A New Record has been created');
      cursor(8,20);
      write('Press <CR> to return to Passport Data Entry Menu'); cursor(8,69);
      readln;
   end;
end;


PROCEDURE pdem; {Passport data entry menu}
var
option:string;
 cnt, cnt1 : real;
 pw, kid:string;

 begin
 clear;
 box(5,4,14,55,2);
 cursor(10,10);
 write('Enter Your Access Code');
 cnt:=0;
 cnt1:= 0;
 kid:= '';
 pw := '';
 repeat
 cnt := 0;
 kid:= '';
 cursor(10,28);
 repeat
   cursor(10,28 + cnt);
   attr(' ',5,10,36+cnt,6); pw := inkey;
   uc(pw);
   kid:= kid | pw;
   cnt:= cnt + 1;
   cursor(14,40);
   until (pw = '' ) or (cnt = 3);
   cnt1:=cnt1+1;
   if kid < > 'NEW' then
    begin cursor(12,25); writeln(Chr(7),'Invalid Access Code');
    cursor(14,20); write('Please, Try Again !'); end;
```

```
 until (kid='NEW') or (cnt1>1);
 if kid = 'NEW' then
 BEGIN

repeat
 clear;
 box(1,2,21,69,2);
 clearbox(2,4,19,65,1);
 Cursor(3,15);
 Writeln('IMMIGRATION AND CONSULAR MAIN DEPARTMENT');
 cursor(4,4);
 write('═══════════════════════════════════════════════════════');
 cursor(5,18);
 write('  PASSPORT DATA ENTRY MENU  ');
 chattr(-2,5,18,32);
 cursor(6,4);
 write('═══════════════════════════════════════════════════════');
 cursor(9,15);
 write('N. NEW ');
 cursor(11,15);
 write('R. RENEWAL');
 cursor(13,15);
 write('E. CORRECTION ');
 cursor(15,15);
 write('F. REPLACEMENT ');
 cursor(18,4);
 write('═══════════════════════════════════════════════════════');
 cursor(19,5);
 write('Press Letter of Choice');
 cursor(19,35);
 write('Press <F3> to Main Menu');cursor(19,30);

 choice2 :='N';
 {Passport Data Entry menu}
 x1:=kbdkey(choice1);
   uc(choice1);
   if choice1 ='N' then
   begin
     npde;{New passport data enry menu opens}
     open('watch');
     chkwl;
     if s2 >=1 then
       wlfnd
    else
       msg1;{Produces a message that no match in the WL database}
    close; {Closes the watch list database}
   IF (((choice1 ='C')) or((choice2 <>'N') AND (choice2 <>'n'))) then
   BEGIN
    open('passdb');
    chkpassdb; {Passport database is checked}
    if s2 >= 1 then passdbfnd
   else
    begin
     msg2; {Produces a message that no match was found in the Passport database}
       dd :=inkey; uc(dd);
    end;
   if (choice2 = 'Y') or (choice2 ='y') then
     neec {Create a new record}
```

```
      else
        If dd ='Y' then
         neec; {Creation of new record}
    end;
   end;
 until (x1=61);
 END
 else
  BEGIN
  clear;
  box(5,5,14,55,2);
  cursor(6,27); write('SORRY!!');
  cursor(8,15); write('You are not authorized to access');
  cursor(10,15); write('the data entry option you selected');
  cursor(14,20); write('Press <CR> to return Main Menu');cursor(14,53);
  readln;
 end;
 end;

 PROCEDURE pavsm; {Passport and Visa data entry menu}
 var
 option:string;
  cnt, cnt1 : real;
  pw, zaf:string;

  begin
  clear;
  box(5,4,14,55,2);
  cursor(10,10);
  write('Enter Your Access Code');
  cnt:=0;
  cnt1:= 0;
  zaf:= '';
  pw := '';
  repeat
  cnt := 0;
  zaf:= '';
  cursor(10,28);
  repeat
    cursor(10,28 + cnt);
    attr(' ',5,10,36+cnt,6); pw := inkey;
    uc(pw);
    zaf:= zaf | pw;
    cnt:= cnt + 1;
    cursor(14,40);
    until (pw = '' ) or (cnt = 3);
    cnt1:=cnt1+1;
    if zaf < > 'PAS' then
      begin cursor(12,25); writeln(Chr(7),'Invalid Access Code');
      cursor(14,20); write('Please, Try Again !'); end;
  until (zaf='PAS') or (cnt1 > 1);
  if zaf = 'PAS' then

 BEGIN
 repeat
  clear;
  box(1,2,21,69,2);
  clearbox(2,4,19,65,1);
```

```
  Cursor(3,15);
  Writeln('IMMIGRATION AND CONSULAR MAIN DEPARTMENT');
  cursor(4,4);
  write('═══════════════════════════════════════════════');
  cursor(5,18);
  write('  PASSPORT AND VISA DATA ENTRY MENU  ');
  chattr(-2,5,18,36);
  cursor(6,4);
  write('═══════════════════════════════════════════════');
  cursor(9,15);
  write('G. NEW PASSPORT AND VISA');
  cursor(11,15);
  write('H. RENEWAL OF PASSPORT AND VISA');
  cursor(13,15);
  write('I. CORRECTION OF PASSPORT AND VISA');
  cursor(15,15);
  write('J. REPLACEMENT OF PASSPORT AND VISA ');
  cursor(18,4);
  write('═══════════════════════════════════════════════');
  cursor(19,5);
  write('Press Letter of Choice');
  cursor(19,35);
  write('Press <F3> to Main Menu');cursor(19,30);
  x1:=kbdkey(choice1);
    uc(choice1);

until (x1=61);
end
else
 BEGIN
 clear;
 box(5,5,14,55,2);
 cursor(6,27); write('SORRY!!');
 cursor(8,15); write('You are not authorized to access');
 cursor(10,15); write('the data entry option you selected');
 cursor(14,20); write('Press <CR> to return Main Menu');cursor(14,53);
 readln;

end;
end;
PROCEDURE Visam; {Visa Data entry menu}
var
option:string;
 cnt, cnt1 : real;
 pw, fis:string;

 begin
 clear;
 box(5,4,14,55,2);
 cursor(10,10);
 write('Enter Your Access Code');
 cnt:=0;
 cnt1:= 0;
 fis:= '';
 pw := '';
 repeat
 cnt := 0;
 fis:= '';
```

APPENDIX F: SCREEN FLOW
==========

SCREEN 1 : WELCOME

```
IMMIGRATION AND CONSULAR MAIN DEPARTMENT

WELCOME

TO

IMMIGRATION DATA ENTRY SERVICE
```

Press any key to continue

SCREEN 2 : PASSWORD-1

```
IMMIGRATION AND CONSULAR MAIN DEPARTMENT

Enter User Password _____________
```

SCREEN 3 : INVALID PASSWORD-1

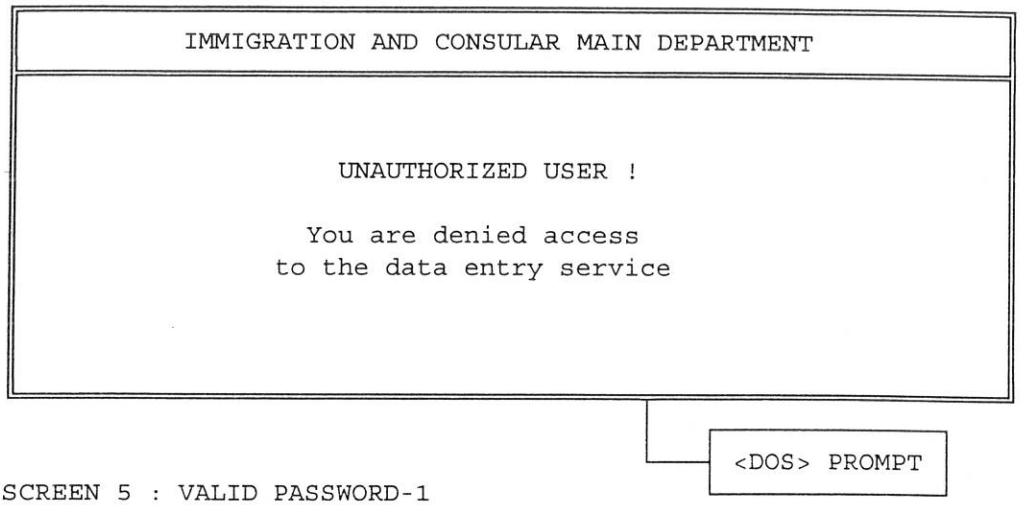
```
IMMIGRATION AND CONSULAR MAIN DEPARTMENT

Enter user Password _____________

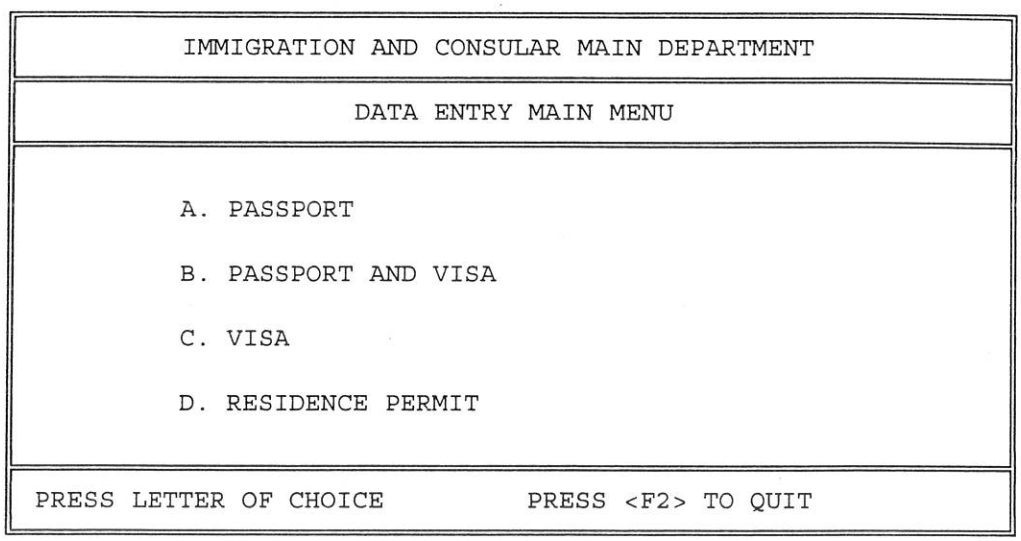
Invalid Password

Please, Try again !
```

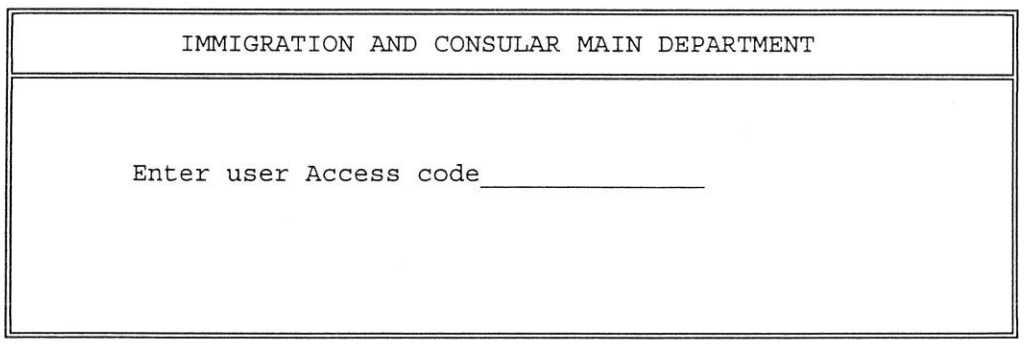
SCREEN 4 : INVALID PASSWORD-1 = AFTER THREE TIMES ATTEMPT



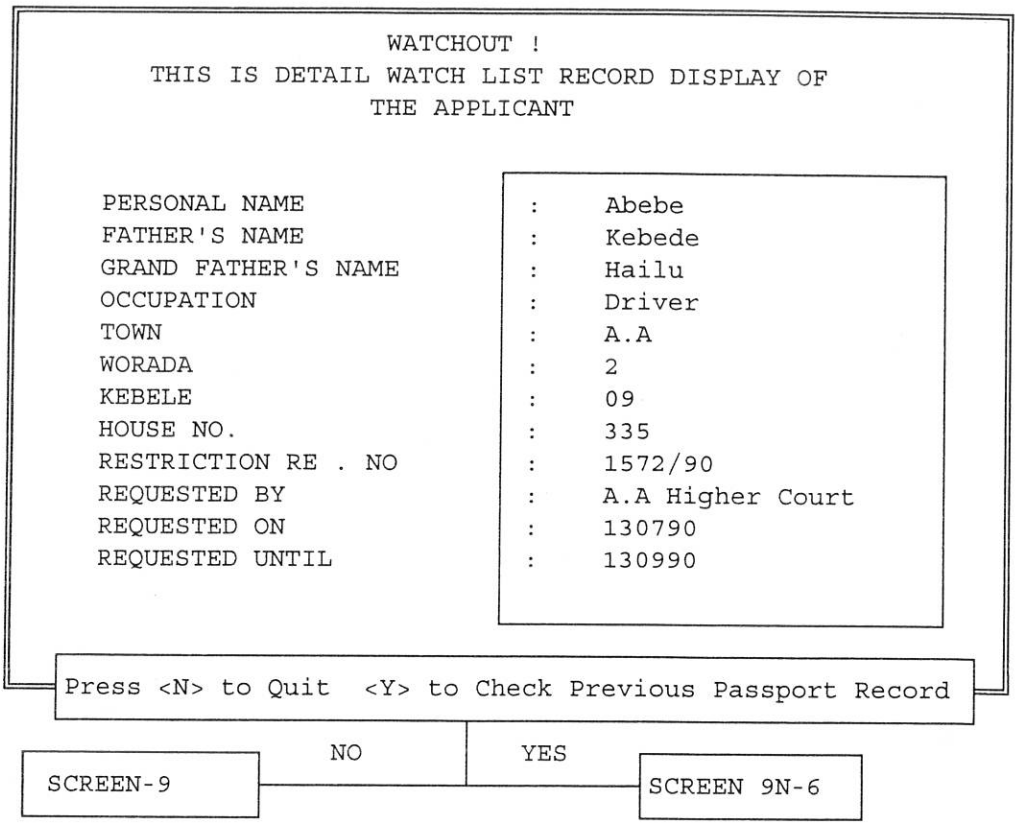
SCREEN 5 : VALID PASSWORD-1



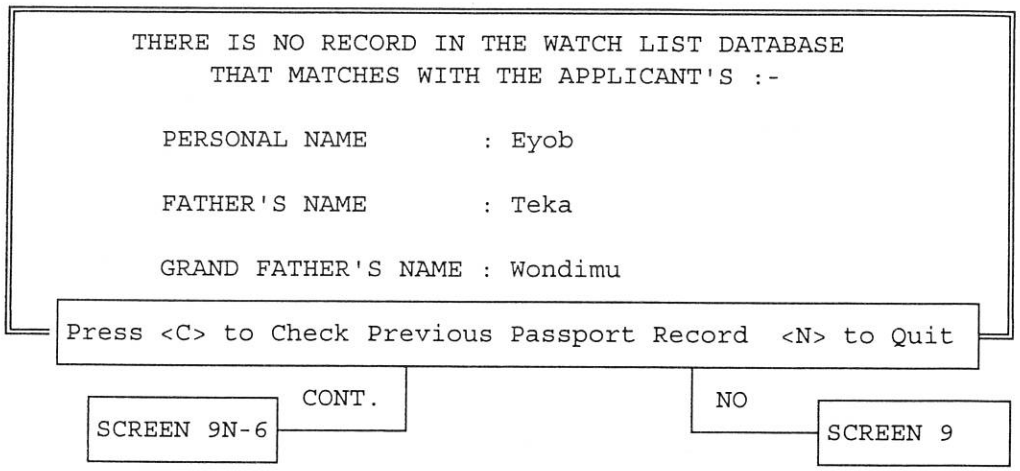
SCREEN 6 : PASSWORD-2 = FOR ALL DATA ENTRY OPTIONS



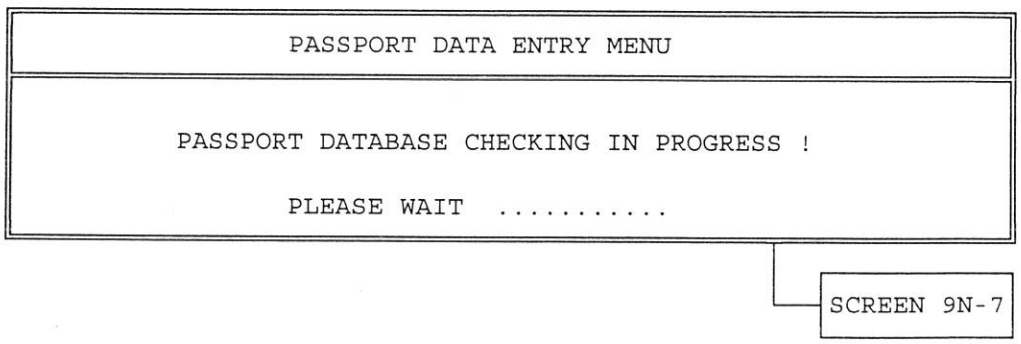
SCREEN 9N-4 : DETAIL WATCH LIST RECORD DISPLAY



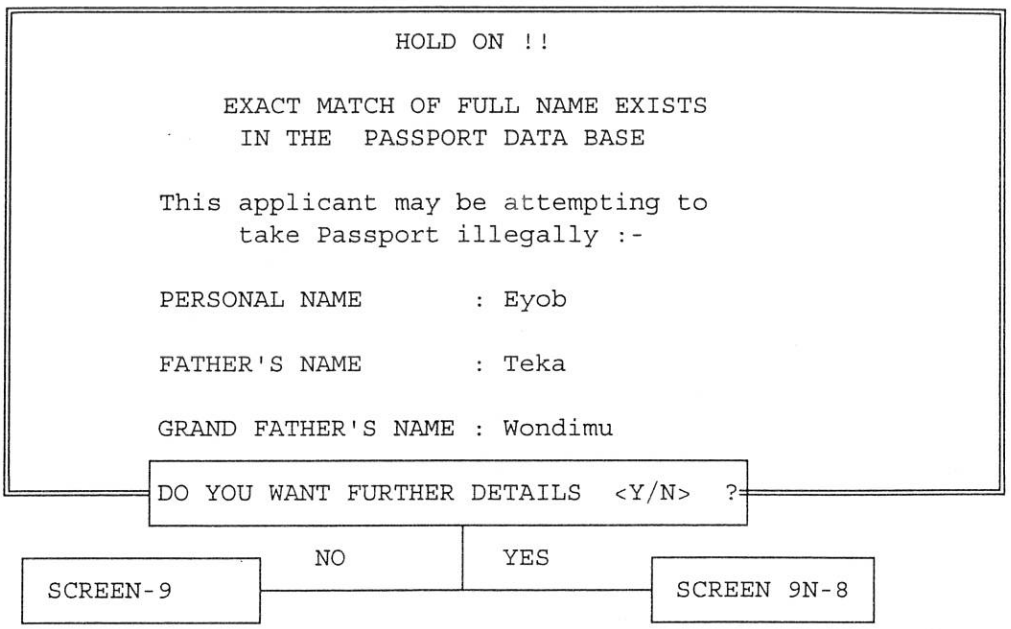
SCREEN 9N-5 : MATCHING RECORD DOESN'T EXIST



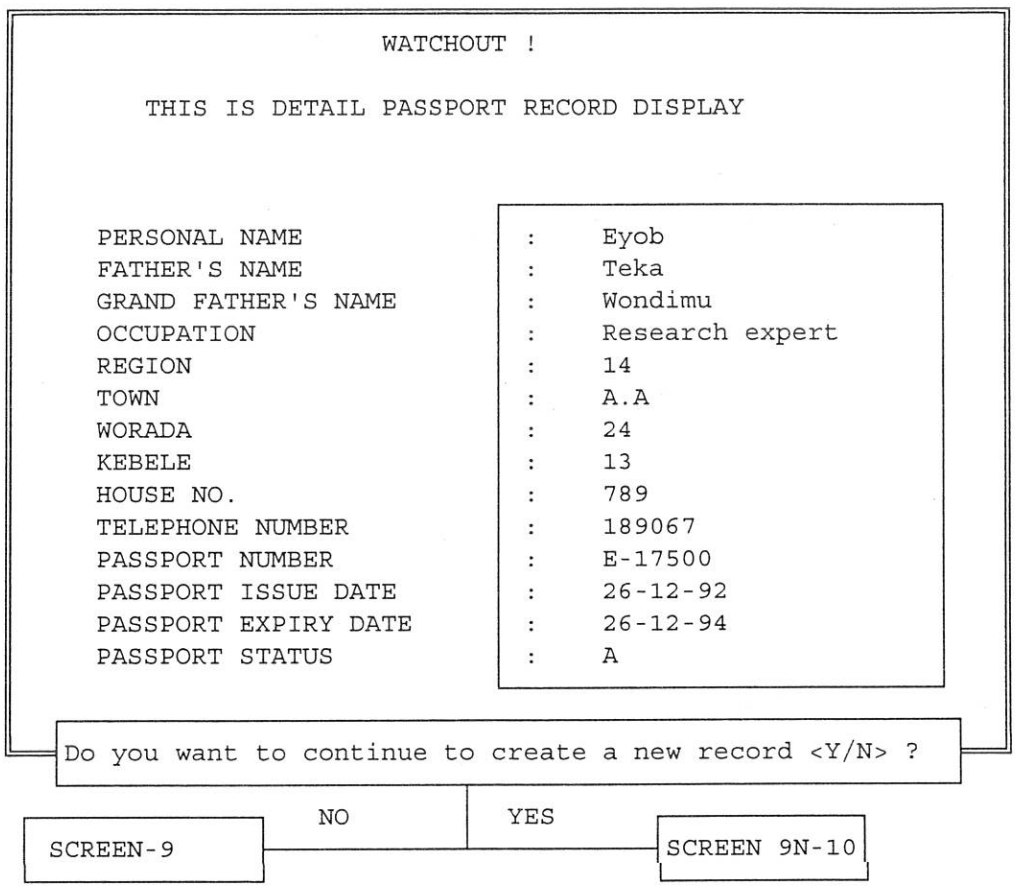
SCREEN 9N-6 : PASSPORT DATABASE CHECK



SCREEN 9N-7 : MATCHING RECORD FOUND IN PASSPORT DATABASE



SCREEN 9N-8 : DETAIL PASSPORT RECORD DISPLAY



SCREEN 9N-9: MATCHING RECORD DOESN'T EXIST IN THE PASSPORT DATABASE

THERE IS NO RECORD IN THE PASSPORT DATABASE
THAT MATCHES WITH THE APPLICANT'S :-

PERSONAL NAME : Alemu

FATHER'S NAME : Worku

GRAND FATHER'S NAME : Belete

DO YOU WANT TO CREATE A NEW RECORD <Y/N> ?

NO → SCREEN 9

YES → SCREEN 9N-10

SCREEN 9N-10 : CONFIRMATION FOR CREATION OF NEW RECORD

Are you sure you want to create a new record ?

Confirm <Y/N>

NO → SCREEN 9

YES → SCREEN 9N-11

SCREEN 9N-11 : DATA ENTRY WORKSHEET

PERSONAL DATA ENTRY WORKSHEET

FILE NUMBER_____

PERSONAL NAME _____ FATHER'S NAME _____

GRAND FATHER'S NAME_____ BIRTH DATE_____ BIRTH PLACE_____ _____

DOMICILE Ethiopia REGION_____ TOWN_____ WORADA _____

KEBELE _____ HOUSE NO. _____ TELE. NO. _____ ID NUMBER_____

ID ISSUED BY _____ OCCUPATION_____

HEIGHT _____ EYE COLOUR_____ HAIR COLOUR_____ SPECIAL MARK_____

NAME OF CHILD_____ BIRTH DATE OF CHILD_____ NATIONALITY OF CHILD Ethiopian

PASSPORT DATA ENTRY WORKSHEET

PASSPORT NUMBER _____

PASSPORT ISSUE DATE 99-99-99 PASSPORT EXPIRY DATE 99-99-99

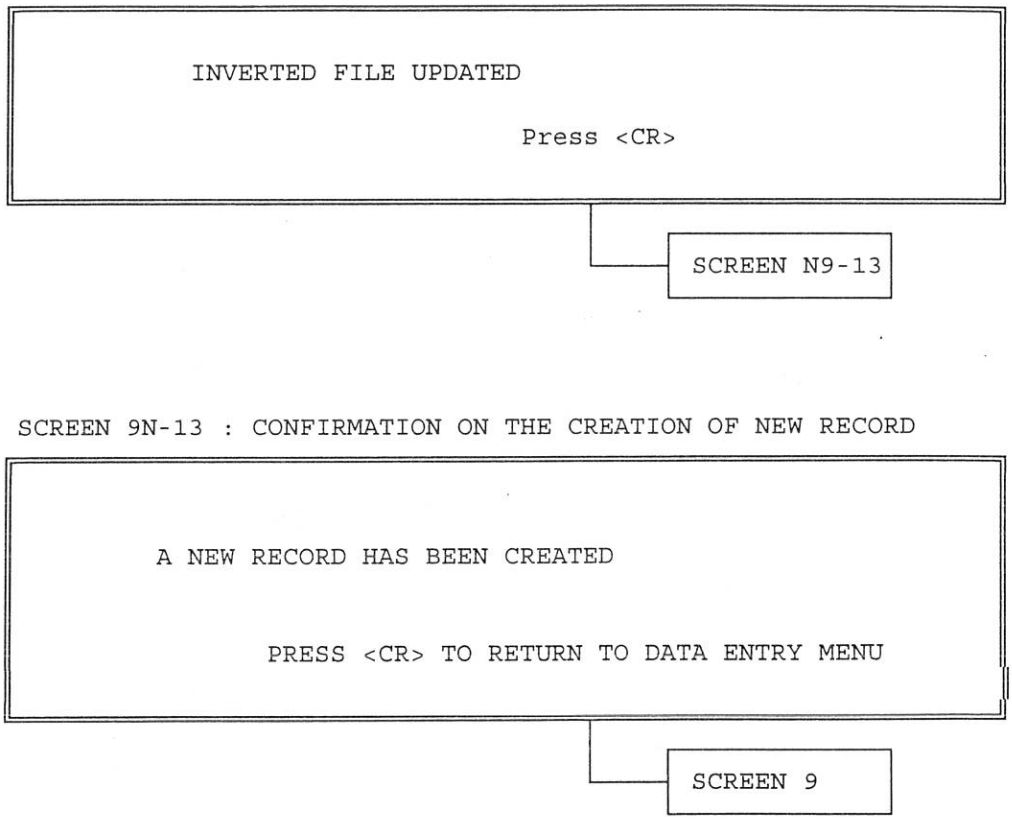
PASSPORT ISSUED BY Ministry of Internal Affairs PASSPORT ISSUE PLACE Addis Ababa

PASSPORT STATUS A PASSPORT STATUS DATE _____

PASSPORT REMARK _____

→ INVERTED FILE UPDATE

SCREEN 9N-12 : INVERTED FILE UPDATING PROCESS COMPLETE



SCREEN 9N-13 : CONFIRMATION ON THE CREATION OF NEW RECORD

APPENDIX G: LIST OF INTERVIEWS

1. Ato Hailu Berhe	Head, Immigration and Consular Main Department.
2. W/o Mahta Ambaye	D/Head, Immigration and Consular Main Department.
3. Ato Wosen-Seged G/Amlak	Head, Passport and Nationality Service Main Divison.
4. Ato Gizachew Adane	Head, Immigration Service Main Divison.
5. Ato Tesfaye W/Mariam	Head, Reception Service Main Division.
6. Ato Damtew Zeleke	Head, Resident Foreigners Section.
7. Ato Tensae-Berhan Teketel	Computer Unit
8. W/t Aster Gedle	Computer unit
9. Ato Zegeye Shewaye	Foreigners Watch List Record Section
10. Fetele-Work Fetene	Ethiopian Nationals Watch List Record Section
11. Ato Makonnen Senbeto	Resident Foreigners Registration Section.
12. W/t Genet Mehari	Resident Foreigners Registration Section, Addis Ababa Branch
13. Ato Kibebew Asfaw	Residence Permit Preparation Unit
14. W/o Mulu Kiros	Reception Section.
15. Shimekt Tefferi	Record Section.
16. Dr. Paulos Gorfu	Systems manager, Bole Immigration branch office

APPENDIX H: LIST OF DOCUMENTS REVIEWED

1. Immigration and Consular Main Department Annual Report, 1991/92.

2. Immigration and Consular Main Department Annual Report, 1992/93.

3. Immigration and Consular Main Department Annual Report, 1993/94.

4. Immigration Database, Ethiopian AirLines, 1991.

5. Immigration and Consular Main Department, Organizational Structure, 1992.

6. Policy guideline on the acquisition of hardware and software, Transitional Government of Ethiopia, Prime Minister's Office, October 6, 1994.

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