KNOWLEDGE BASED SYSTEM FOR

MATCHING OF APPLICANTS TO JOBS

BY

FAITH-MICHAEL EMEKA UZOKA

A THESIS IN THE DEPARTMENT OF INDUSTRIAL MATHEMATICS AND COMPUTER SCIENCE, SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE, NIGERIA, TOWARDS THE AWARD OF THE DEGREE OF MASTER OF TECHNOLOGY (M.Tech) IN COMPUTER SCIENCE

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ABSTRACT

Knowledge based systems assist human experts in solving problems in a given domain, especially where straightforward enumeration of solution possibilities tends to be explosive. In this study, a Knowledge Based System for Matching of Applicants to Jobs, christened KBSMAJ, is developed. The KBSMAJ has as its main objective, the matching of applicants to appropriate jobs, avoiding the frustration and some other problems inherent in the manual system of personnel procurement. It also produces periodic reports on existing jobs in various organisations to assist in job redistribution.

The framework of KBSMAJ has four basic components. The first, which is the Knowledge Base, contains structured and unstructured knowledge of human resource management. Second, the Inference Engine, which employs the use of production rules in matching applicants to jobs. Third, the Decision Support System (DSS), which takes as input, the alternative matches of applicants to jobs and advises the human experts on the best match, based on some components, the cognitive filter and emotional filter. Fourth, is the User interface, which facilitates interaction between the user and the system.

The implementation of KBSMAJ is carried out in Paradox Relational Database Management System (PRDBMS) environment. Hypothetical data are formed and the results of the processes are reported. The practical implementation of the system is carried out for the purpose of demonstrating the utility of the system and for gaining the confidence of the Human Resources managers (HRMs) who are the ultimate users of the system.

DEDICATION

This research is dedicated to God in His glory and for His provisions.

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CERTIFICATION

This is to certify that this work has been carried out by Faith-Michael Emeka Uzoka in the Department of Industrial Mathematics and Computer Science, Federal University of Technology, Akure; and that the work has not been submitted elsewhere for the award of a degree.

Dr. S.O. Falaki 24/5/18

Head of Department

Dr. O. C. Akinyokun.

Supervisor

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

Computers have served as an aid to decision making in recent years, mostly because of its efficiency in terms of speed, accuracy, reliability, mass processing, cost and security, among others. Thus, it is not uncommon to find computers being applied in almost every human activity. However, in recent years, a new wave of awareness has existed in people as it concerns the use of computers in administrative and planning areas of business activities. These areas require both quantitative and qualitative information. Organizations have thus, adopted the use of Management Information Systems (MIS) and Decision Support Systems (DSS) in their decision processes.

Human Resources Management (HRM) involves the use of both quantitative (structured) and qualitative (unstructured) information. Decisions are largely based on intuition, principles and experience. In recent times, efforts are being made to build intelligence into computing system, whereby the computer can be used to process large volumes of quantitative and qualitative information for decision making.

It is therefore, not uncommon today, to find some organizations, especially in developed countries, employing the use of computing system for their personnel recruitment and to an extent, selection exercises. With such a system, the applicant just walks into the employment office, sits down at a computer terminal, responds to questions on the screen by typing his answers on the keyboard and receives his employment information. At the end of the day,

resumes are fed into the organization's central memory bank, where they can be quickly scanned to identify the desired number and characteristics of applications for various jobs.

Currently, Nigerian organisations adopt the manual method where jobs are advertised and applicants send their applications/resumes for consideration by a team of recruitment officers.

1.1 THE MOTIVATION FOR THE PROJECT

The conventional recruitment exercise involves a process which starts with a requisition from the Head of each department of an organisation who is charged with the responsibility of evaluating, monitoring and controlling his departmental budget. The requisition is passed on to the personnel department or the appointment committee, whose duty it is to develop appropriate recruitment, selection and placement programmes.

The personnel department advertises the job vacancies. Such advertisements have the following shortcomings:

a. They do not get across to every potential applicant due to the fact that the medium chosen for the advertisement may not be such that is accessible to potential applicants. The result of this is that limited number of applicants that are suitable for the jobs apply.

b. The advertisements are expensive and in most cases, are only a formality, as the job positions are filled by relatives of top managers even before the advertisements are out.

c. Job descriptions and specifications are not always well defined in such

advertisements, to the effect that potential applicants are misinformed about the requirements and duties associated with the jobs.

d. Applicants spend a lot of money producing many copies of application letters and resumes in response to the advertisement. Because of the poor performance of the Nigerian Postal Service (NIPOST), many applications get lost in transit. Even when the selection process is carried out, some applicants who are found appointable get their letters late. The time lag between employment and notification could be so much, to the effect that qualified and appointable candidates may have found other jobs before notification letters get to them.

The above stated shortcomings create a situation whereby the organization fails to get the right quality and quantity of personnel to fill the available vacant positions. The personnel department, in an attempt to get the right calibre of staff, spends all the time in recruitment and selection exercises. By so doing, other human resource programmes such as training, promotions, job enrichment/enlargement, compensation, integration and maintenance are neglected.

It is in response to the need to establish an effective recruitment process that would take care of the shortcomings of the existing manual system, that a centralized knowledge based computer system is proposed. Such a system will have a data bank of employment opportunities existent in organizations and a corresponding bank of potential applicants' information.

Organizations who are in need of any category of personnel would send their requisitions, including job analysis, to the bureau, whose duty would be to

maintain the data bank and print out such information for potential applicants who would eventually be recommended to suitable organizations for employment. This will save the organizations a lot of problems associated with personnel recruitment. Such problems include cost of advertisement and conducting of interviews; the delay associated with the manual process of recruitment; and the inability to get the right quantity and quality of staff. It also saves the applicants the problem of having to search for organizations where there are available vacancies, and the anxiety associated with waiting for responses to their applications.

1.2 OBJECTIVES OF THE PROJECT

The primary aim of this research is to provide a reliable and efficient knowledge based system that would assist an employment bureau in matching applicants to jobs. Such a system would enable applicants get the right jobs at the right time with little stress and cost. Moreover, organizations are able to get the right quality and quantity of employees at the right time and at a reduced cost. In specific terms, the research has the following objectives:

a. To create a data bank that would contain information on organizations, the jobs available in such organizations, and requirements of such jobs.

b. To create a data bank of potential applicants, with emphasis on their qualification, experience and job requirements.

c. To match applicants with jobs and recommend such applicants to appropriate organizations for possible employment.

d. To aid manpower redistribution by publishing periodic reports on jobs in

various organisations.

1.3 RESEARCH METHODOLOGY

In the attempt to carry out this research, the following steps were taken:

a. Review of related literature on expert system.

b. Analysis of the manual method of personnel recruitment.

c. Design of a framework for knowledge based system for matching of applicants to jobs.

d. Study of Paradox Relational Database Management System, which is adopted for the practical Implementation of the knowledge Based System.

e. Case study of the knowledge based system using hypothetical data.

1.4 ORGANIZATION OF THESIS

Chapter two reviews the related literature on expert system. It also examines some expert system and discusses an important aspect of expert system called 'pattern matching'. In Chapter three the manual method of personnel recruitment is analysed, and the limitations are highlighted.

In Chapter four, the framework for the knowledge based system for matching of applicants to job is presented.

The case study of the proposed framework is carried out in chapter five and the results obtained are presented.

In chapter six, some conclusions are drawn and recommendations for further studies are made.

CHAPTER TWO

LITERATURE REVIEW OF EXPERT SYSTEM

In this chapter, some existing literature on expert system, are reviewed. Section 2.1 gives an overview of artificial intelligence. In section 2.2, the concept of expert systems is discussed, while section 2.3 gives a review of some expert systems. In section 2.4 the concept of pattern matching is discussed.

2.1 OVERVIEW OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is discussed extensively in [Akinyokun, 1996]. It is the part of Computer science concerned with designing intelligent computer systems, that is, systems that exhibit the characteristics we associate with intelligence in human behaviour such as understanding language, learning, reasoning and solving problems. In order words, AI is concerned with programming computers to perform tasks that are presently done better by human beings because AI system involves such higher mental processes as perceptual learning, memory organization and judgement reasoning. Thus writing a program to perform complicated statistical calculations would not be seen as an AI activity, while writing a program to design experiments and test hypotheses would.

It has been pointed out in [Akinyokun, 1996] that there are differences of opinions and emphasis among the AI scholars. Some are inclined towards the view that AI is a branch of engineering, since it is ultimately about building intelligent artifacts. Others stress the link with cognitive science. Cognitive science is a discipline, which concerns itself with the study of human information processing. Still others are interested in the overlap with problems of philosophy associated with knowledge and consciousness.

At the bottom, AI is about the simulation of human behaviour: the discovery of techniques that will allow us to design and program machines which both emulate and extend our mental capabilities. The discipline is therefore related to a wide range of other academic subject areas such as computer science,

psychology, philosophy, linguistics and engineering.

Psychology is the study of how models are represented in the brain, and how they do interact with the mechanism of perception, memory and learning, and affect or control behaviour. Linguistics is the study of relationship between a word, the object of names and mental models of the rules of syntax and semantics that relate model to sentences. Philosophy is the study of the relationship between knowledge, meaning and mental models. It looks into how the models are used in reasoning and how such reasoning are related to formal logic. Computer science is the study of a person's model of the world as reflected in a computer system. It is concerned with the study of the languages and tools needed to describe such models and relate them to outside systems. Furthermore, it looks into how the models can support a computer interface that people would find it easy to use.

The beginning of AI can be seen in the first game-playing and puzzle-solving programme. Game-playing and puzzle solving involves state space search which can be formulated in the term of important ingredients:

a. A starting stage, for example, the initial state of the chess game.
b. A test for detecting final states or solutions to the problem, for example, the simple rule for detecting the end of the chess game.
c. A set of operation that can be applied to change the current state of the problem, for example, the legal moves of the chess game.

One way of thinking of this conceptual space of states is as a graph in which the states are nodes and the operation are arcs. Such space can be generated as one moves from one node to another. The simplest form of state space search is called 'generate and test' and the algorithm is as follows:

a. Generate a possible solution, in the form of the state in the search space, for example, a new board position as the result of a move.
b. Test to see if this state is actually a solution by seeing if it satisfies the conditions for success.
c. If the current state really is a solution, then quit, else go back to the first

step.

There are two variants to generate and test algorithms namely, depth-first search and breadth-first search. The differences between them, lies in the order in which possible solution are generated in step (a). At any given node, N, depth-first search considers the 'successors ' of N; that is, those state which result from applying operators to N, before considering siblings of N. In depth-first search, one pursues a single path at a time, returning to N to pick another path only if the current path fails. In breadth-first search, N's siblings are checked out before going on to N's successors. Thus, in breadth-first search, one searches layer by layer through successive levels of the search space.
Breadth-first search finds the shortest solution path, if there is one, but depth-first search gets there faster if it makes good decision when choosing which path to pursue next. The depth-first search may never terminate if the search space is infinite, even if a solution exists along some as yet unexplored path. The guided depth-first search sometimes described as best-first search is such that at each point, one is trying to make the best decisions as to where to look next.
In the game playing there is the problem of combinatorial explosion, which results from the exponential growth of the solution space. The brute force enumeration of all the alternative paths using algorithmic procedure may be intractable. Therefore the need arises for the application of experience, imagination and analytic skills to the selection of both overall strategies and winning moves. These procedures can be described as heuristic. A heuristic is best thought of as a rule of thumb. It is not guaranteed to succeed in the way that algorithm or decision procedure is.

A common form of heuristic search is refereed to as 'hill climbing'. This involves giving the program an evaluation function, which it can apply to the current state of the problem in other to obtain a rough estimate of how well things are going. The algorithm for hill climbing is as follow:

a. Generate a possible solution as with step (a) of 'generate and test' algorithm.

b. From this point in the state space, apply rules that generate a new set of possible solutions.

c. If any state in the newly-derived set is a solution, then quit with success, else take the 'best' state from the set, make it the current state, and go back to the second step.

The limitations of the hill-climbing technique are:

a. The evaluation function may not be a faithful estimate of the goodness of the current state of the problem.

b. The current evaluation may lead to a peak position (local maximum) from which the only way is down, while the goal is on some other higher peak.

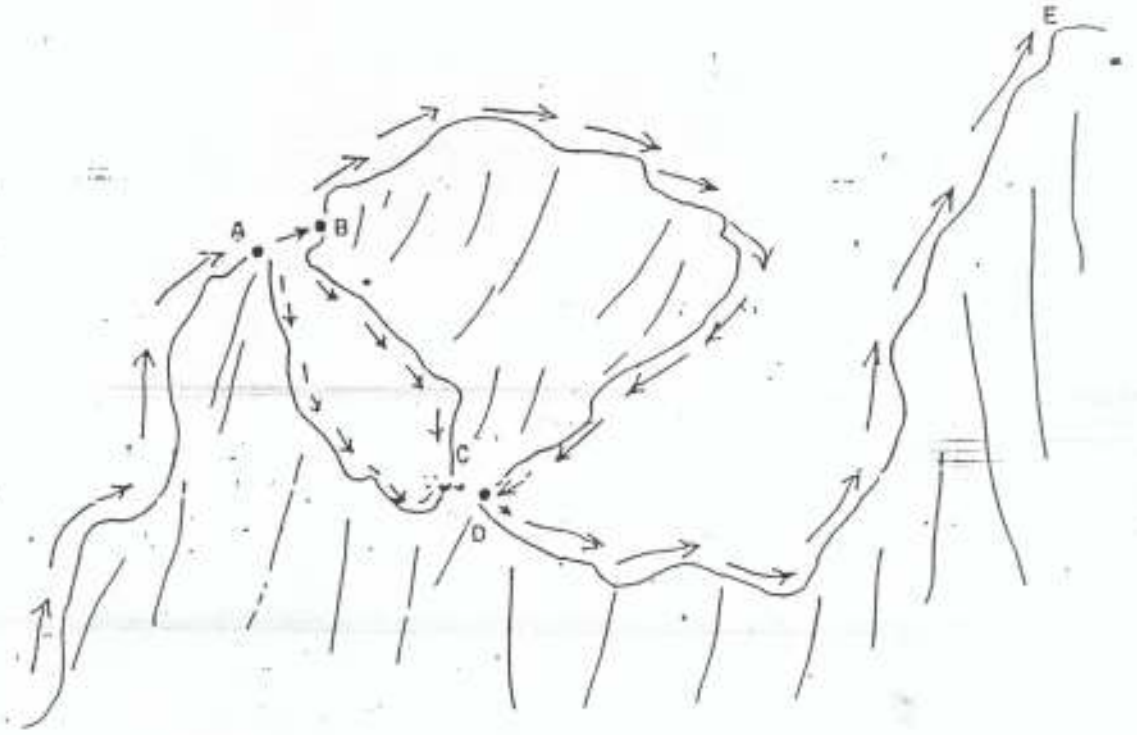


Figure 2.1 - Conceptualization of Hill Climbing

The path that can be taken by mountaineers on a typical mountain is conceptualized in figure 2.1. A mountaineer who jumps from point A to B initially appears to have taken a short path compared with that which has taken

points A through C. Thus B is local optimal.

The earliest works on AI focused on the construction of generalized purpose intelligent systems such as game playing, theorem proving and puzzle solving. The emphasis was on powerful inference methods that could function efficiently even when the available domain-specific knowledge was relatively meagre. Today, the emphasis is on role specific and detailed knowledge, than on reasoning methods.

The first successful application of this method, which goes by the name, knowledge based or expert system, is DENDRAL, which began at Stanford University in 1965. DENDRAL attempts to determine automatically the molecular structure of an unknown organic compound from emperical formulas and mass spectral data. Prominent among the other existing and popular expert system, is MYCIN. MYCIN is meant to assist a physician who is not an expert in the field of diagnostics and therapy of blood infectious diseases.

2.2 THE BASIC CONCEPT OF EXPERT SYSTEM

The conventional file system and database system have proved effective for solving problems with a mathematical or statistical basis or routine data processing nature. However, in areas such as management, industry and medicine, important problems exist which do not fit this category. Solving such problems is still critically dependent on human expertise, skills such as identifying and relating the key factors, weighing evidence, evaluating alternatives, predicting outcomes and making complex decisions. Expert system has evolved as a model of human expert capable of processing data, reasoning about the alternative results and taking decisions typical of human being.

An expert system (ES) is basically a computer system, which possesses a set of facts about a specific domain of human expertise. An ES uses rule of inference to draw conclusions or make decisions within a defined problem domain. ESs are usually built to be able to explain the line of reasoning that led to their decisions. Some of them can explain why they reject certain paths of

reasoning and choose others.

ESs are mostly applicable in the combinatorial problems where straight forward method of enumeration tends to explosive number of possibilities. ESs attempt to deal with combinatorial problems effectively and efficiently, by means of stepwise elimination of possibilities that are unlikely to prove fruitful.

The basic components of an ES are the knowledge base, inference engine and user interface. The conceptual diagram of the architecture of ES is presented in the figure 2.2

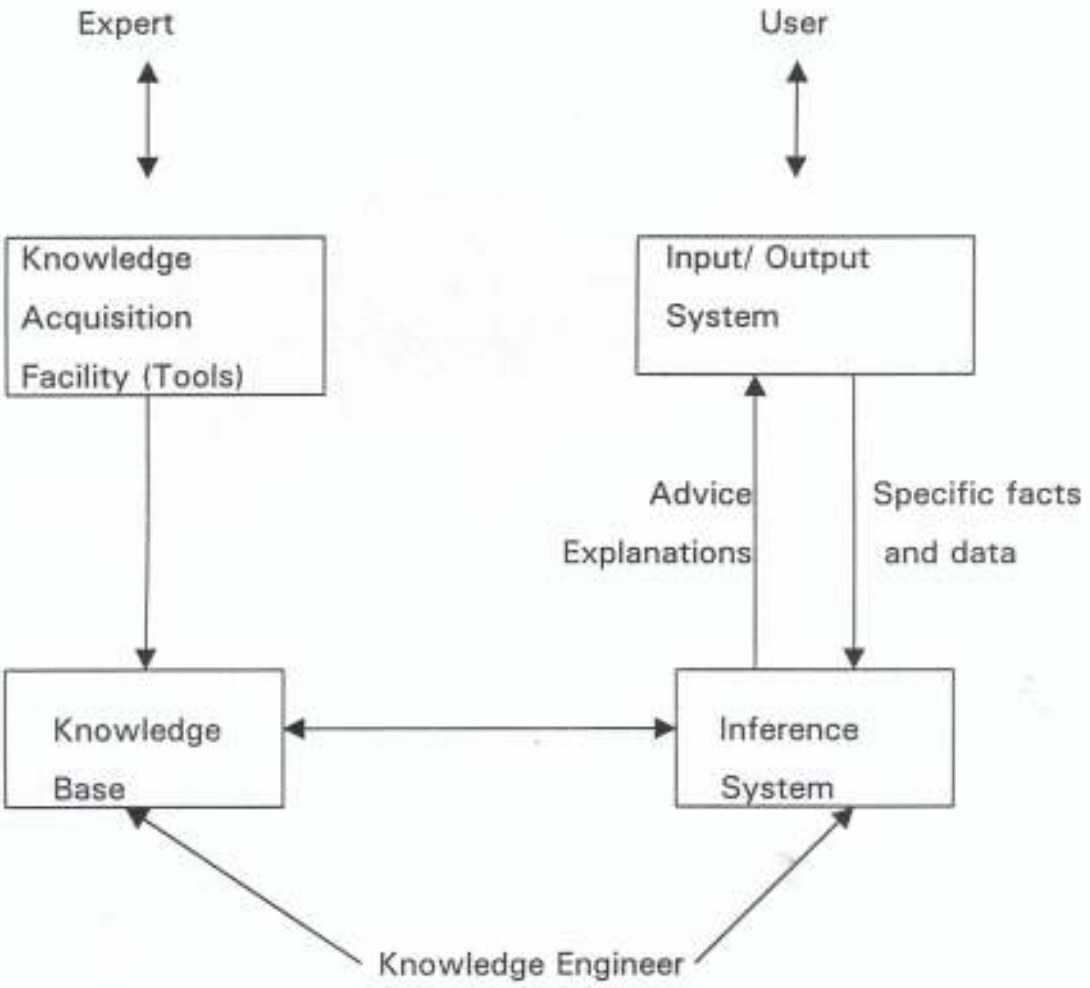


Figure 2.2 - Conceptual Diagram of Expert System

2.2.1 The knowledge Base

Knowledge is the key factor in the performance of an ES. There are two types of knowledge. The first type is the fact of the problem domain which is the widely shared knowledge commonly agreed upon by the human experts in a particular problem domain. This is the knowledge acquired from text books, technical reports, journals, conference proceedings and lecture notes. The second type of knowledge is the heuristic knowledge, which is the knowledge of good practice and good judgement in a field. It is experiential knowledge, the art of good guessing that a human expert acquires over years of work. For an expert system to solve a problem at high level of human expertise, it must have both kinds of knowledge in its knowledge base. These knowledge are broken down into their atomic components and the conceptualization of these components is shown in figure 2.3.

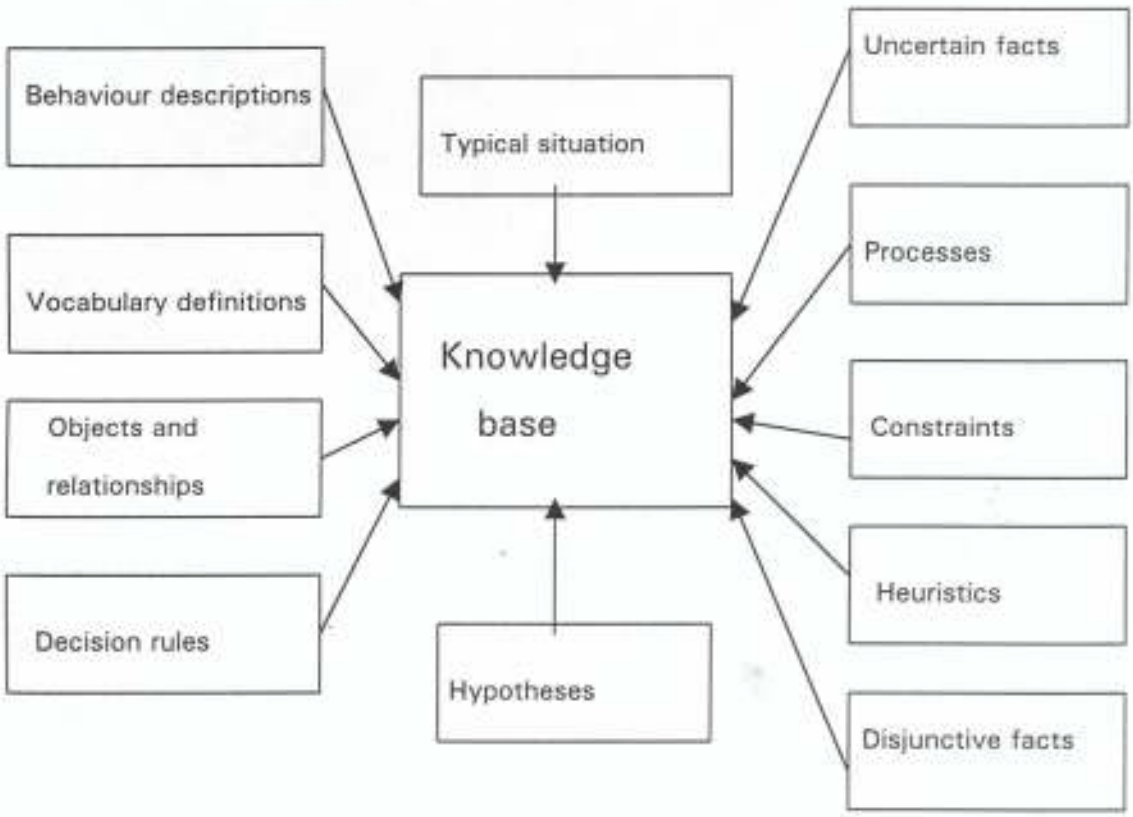


Figure 2.3 – Atomic Components of Knowledge

Knowledge acquisition and representation form the major scientific issues in the practical implementation of ES. Three basic methodologies, namely: frames,

production rules and predicate logic are optional techniques for representing knowledge.

2.2.2 The Knowledge Acquisition

The first step in building an expert system, is the acquisition of the necessary knowledge about the problem domain from the human expert by the knowledge engineer. Although numerous ES have been constructed, an effective standardized method for acquiring the expert knowledge has not been developed. At present, the problem still constitutes more of an art than science. The process is currently characterized by an expert at one end, who is unfamiliar with expert system and unable to articulate what knowledge he has and how to use it to solve problems. At the other end, there is the knowledge engineer, who may be ignorant of expertise domain.

The phases of knowledge acquisition are:

a. Conducting interviews with the human expert in the problem domain.
b. Studying the past and present problems and their solutions.
c. Identifying prototypical or idealized problem types and associated solutions.
d. Carrying out literature research.
e. Systematic observation of and collection of verbal protocols from experts at work in a real environment solving actual, as opposed to hypothetical problems.

2.2.3 The Knowledge Representation

A production system consists of rule set (production memory), a rule interpreter that decides how and when to apply which rule, and a working memory that can hold data, goal and intermediate results.

The basic cycle of a production rule system consists of a select phase and an execute phase. During the execute phase, the system interprets the selected rule to draw inferences that alter the system's dynamic memory. The working memory includes components for long-term static data and short-term dynamic data. The long-term store, which is the knowledge base, contains rules and

facts. Rules specify actions the system should initiate when certain triggering conditions occur. These conditions define important patterns of data that can arise in the working memory. The system presents data in terms of relations, propositions or equivalent logical expressions. Facts define static, true propositions. In contrast to conventional data processing systems, most production rule systems distribute their logic over numerous independent condition-action rules, monitor dynamic results for triggering patterns of data, determine their sequential behaviour by selecting their next activity from a set of candidate-triggered rules, and store their intermediate results exclusively in a global working memory. The basic features of production rule system is shown in Figure 2.4

A production rule is generally expressed as:

If P_1 & P_2 &.....& P_n

Then Q_1 & Q_2 &.....& Q_m

which reads as follows:

If the premise P_1 through P_n are true then perform actions Q_1 through Q_m where P_i(i = 1, 2, ... n) are the conditions and Q_j(j = 1, 2,.....m), the conclusions. The conditions are usually object-attribute-value triples.

Typical production rules are given as follows:

a. IF (student GPA 3.6) & (student year 5)

THEN (student degree first-class)

b. IF (target bank-robbery courier) &

(robbers went-away money) &

(courier crew non-killed)

THEN (courier-crew police-escort suspect)

Frames can be described as data structures, which provide the mechanism for grouping information in terms of a record of `slots' and filters. This record can be thought of as a complex node in a semantic network, with a special slot

filled by the name of the object that the node is for, and the other slots being filled with the value of the various common attributes associated with such an object.

Frame systems attempt to model classes of object which are related to one another using data abstraction mechanism, such as classification, generalization, aggregation and association. When these data abstraction mechanisms are applied to a universe of discourse, hierarchies of objects are formed.

For example, the aggregation and generalization hierarchies of vehicle service and vehicle are presented in Figure 2.5 and Figure 2.6 respectively. A network of objects is obtained when two or more data abstraction mechanisms are integrated in the conceptualization of a universe of discourse. Typical semantic network is shown in Figure 2.7.

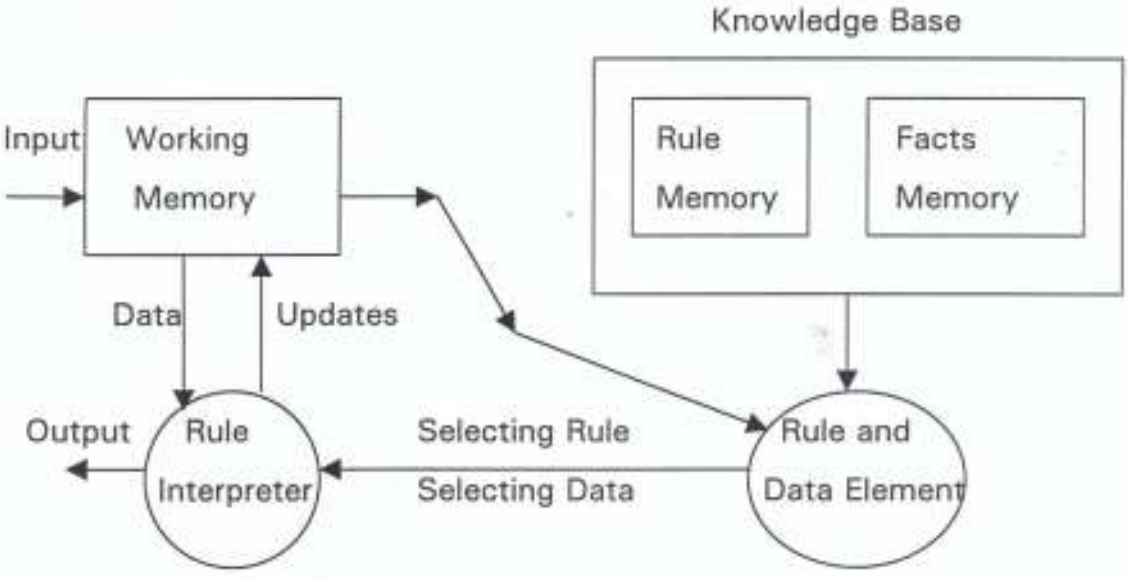


Figure 2.4 - Basic Features of Production Rule System

Predicate logic is used as an analyzing tool to represent facts, general statements, vague statements and complex relationships. The use of logic for knowledge representation involves inference. However, logic does not tell one which inferences should be drawn at any given point in the search for a solution; it only tells which inferences one is entitled to draw according to some rules. In automatic theorem proving, logic programming and knowledge representation, attempt is made to normalize predicate logic. The three main syntactic normalization schemes employed are Conjunctive Normal Form (CNF), Full Clausal Form and Horn Clause Subset.

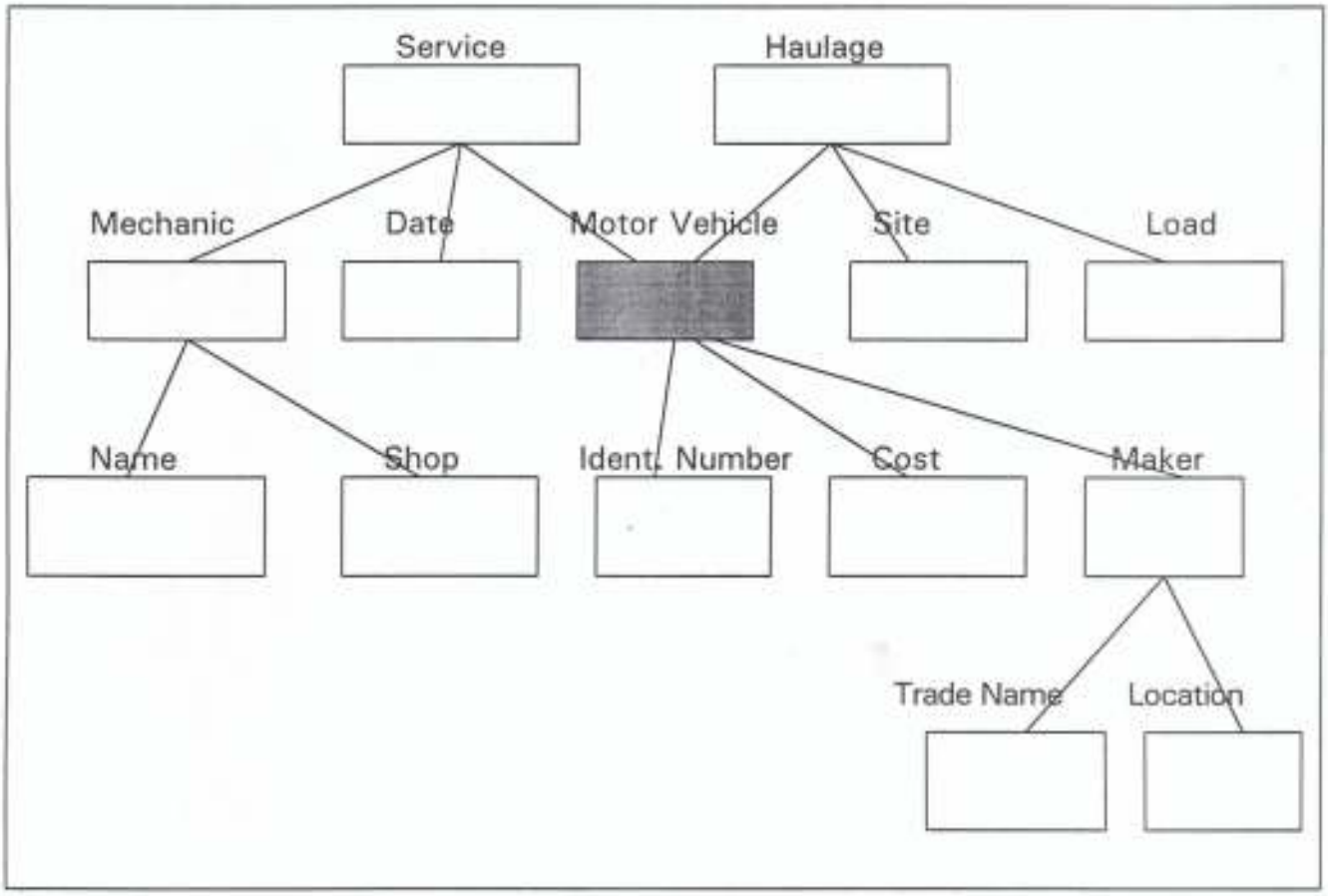


Figure 2.5 – Aggregation Hierarchy of Vehicle Services

A logic program is an arbitrary set of expressions known as clauses. A clause is an expression of the form:

$Q_1, \ldots\ldots Q_n$:- $P_1, \ldots\ldots P_m$

A sentence of this form says that one of the Q_i must be true if all of the P_i are true. The expressions to the left and right of the :- operator in a clause must be atoms, that is, expressions of the form:

$R(T_1, \ldots\ldots T_k)$

where R is a relation constant and where each T_i is a term. A term is either an object constant, a variable or an expression of the form:

$F(T_1, \ldots\ldots T_n)$

where F is a function constant and each T_i is a term.

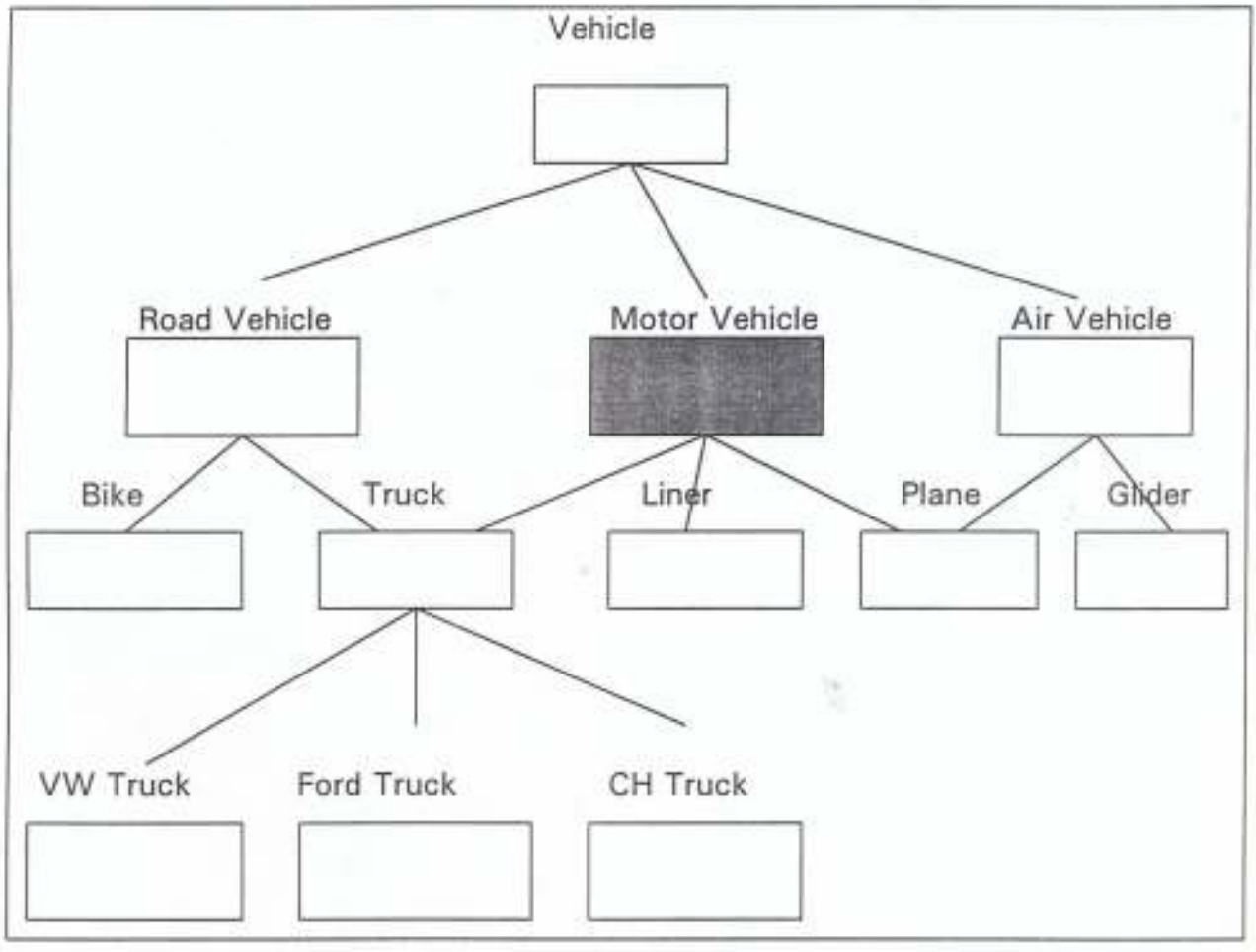


Figure 2.6 – Generalization Hierachy of Vehicles

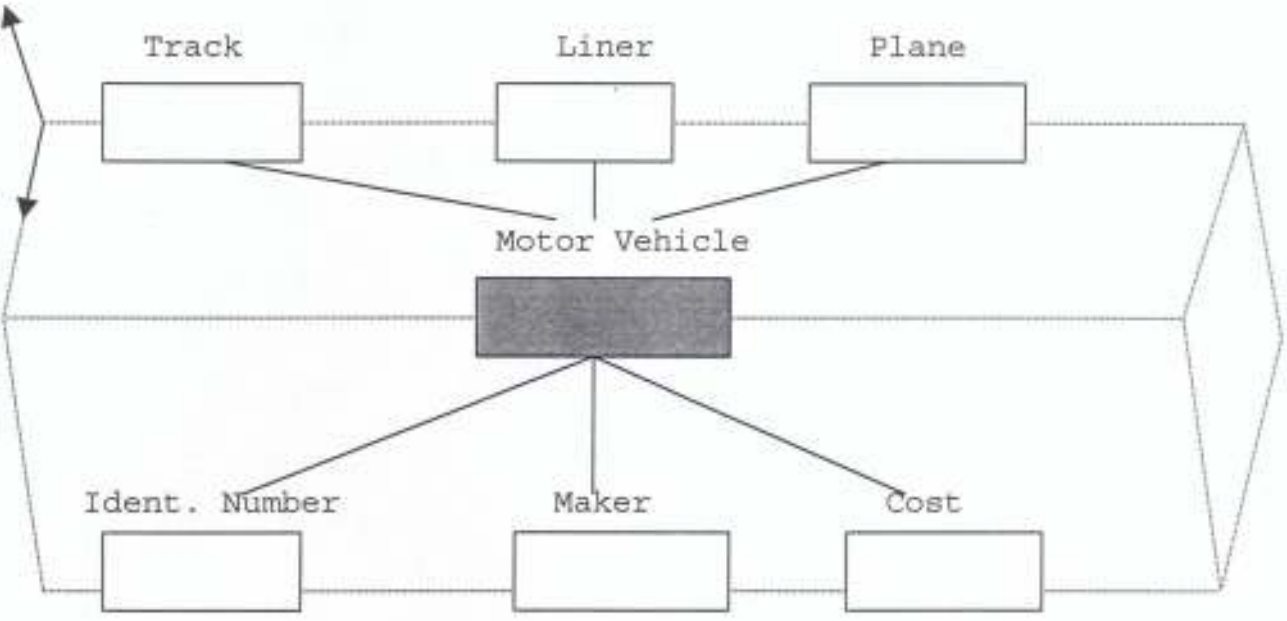


Figure 2.7 – Generalisation and Aggregation Hierarchies

The schematic diagram of a logic programming system is shown in figure 2.8. An application-independent inference procedure is at the centre of any logic programming system. When interrogated by the user, the inference procedure replies after drawing conclusions from the facts in the knowledge base. In some instances, the conclusions drawn are stored in the knowledge base for later use.

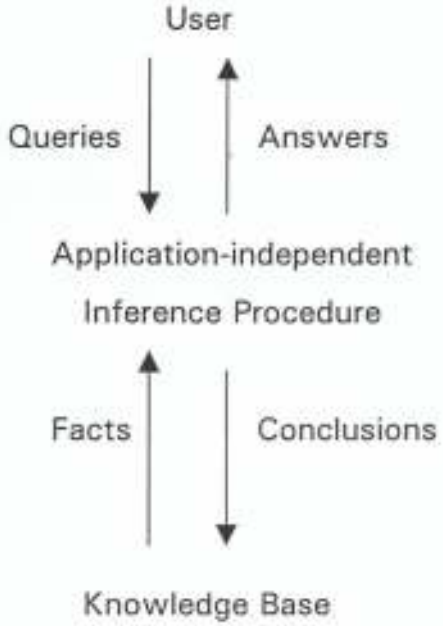


Figure 2.8 – Logic Programming System

The PROLOG programming language gives the knowledge engineer facilities to quantify actions and the pattern matching which are generally more powerful than those afforded by production rule interpreters and semantic network. The fundamental theorem proving method that prolog relied upon is called resolution and refutation. It is remarked however that the theorem proving with full unification inherent in logic programming is computationally expensive in terms of both computer memory and central processing unit. For this reason, it has been thought that the resolution and refutation mechanisms were impossible as a conceptual device for reasoning about problems of realistic complexity. Thus the logic base approach is perhaps less tried and tested as a methodology for the construction of a large scale system. In practice, existing and popular ESs adopt the combination of production rules and semantic network in an attempt to represent knowledge.

2.2.4 The Inference Engine

Knowledge serves as the basis for reasoning by a knowledge processing system but it is not sufficient in itself to discover and use lines of reasoning. The inference engine is concerned with piecing together an appropriate line of reasoning which leads to the solution of a problem or the formulation of a body of consultative advice. Inference procedures can be implemented in two ways, namely: forward chaining and backward chaining.

In the forward chaining strategy, one starts from the available information or assumption and reasons forward to try to infer the conclusions that are appropriate for the problem goal. In other words, forward chaining is the process of arriving at a logically necessary conclusion from initial premises. Consider the investigation of a crime committed in a society where the police might have no idea about the people involved in the criminal offence. The police may therefore have to study the general characteristics of the crime, the circumstantial evidence of the crime, and the history of similar crime committed in the past in order to identify the suspect. Similarly, in a medical diagnostic task, a doctor might have no idea about what is wrong with a patient. He may

therefore work up through the set of reported signs and symptoms until he has narrowed down the set of possible diseases, which can be referred. In the backward chaining, one starts with the desired goal or conclusion and reasons backward through the available data in order to establish all the necessary evidence to support that goal or conclusion. Consider the case of criminal investigation. The police may expect from the start that a group of persons in the society is involved in a crime committed. The police therefore walks backward from this conclusion in order to ascertain the truth of the conclusion initially drawn. In many cases, a conclusion may be valid but the truth value may be false. In such circumstances, it is desirable to reason forward in order to support another course of action.

An ES may support both backward and forward chaining schemes in order to ensure flexibility and the `naturalness' typical of human reasoning. The majority of the real world problems involve decision taking, based on probability. Consequently, most ESs incorporate some form of probabilistic reasoning as part of their inference control mechanism enabling the system to reason with uncertain information. This is often implemented by applying a weighing function to the distribution of the decision extracts from the case history of the given problem.

2.2.5 The User Interface

Most Expert Systems act as consultants in the sense that the user supplies information about the problem and the ES asks relevant questions and then, offers advice or makes decisions. In the light of this, there is a need for user-friendly interface, which will facilitate the conversation between the user and the system. The user interface must ensure that the dialogue facilities match the communication needs and constraints imposed by the class of user for that system, and the types of task in question, without binding the user to respond narrowly to the system's initiatives in order to ensure the ease of use of the ES. The desirable feature of the user interface therefore are the flexibility and mix-initiative style dialogue mechanism which will enable the user to be able to enter

different types of information naturally and efficiently.

A case for natural language interface for ESs has been made in the literature. Research workers in natural language processing have made some progress in providing resources needed for proper interfaces, but the functionality of these resources in ESs is currently limited. For practical purposes, majority of the current research work adopts user interface, which is based on pseudo-natural language and menu driven facility.

2.3 REVIEW OF SOME EXPERT SYSTEMS

In this section, some expert systems are reviewed. Section 2.3.1 discusses MYCIN, which is concerned with the diagnostics and therapy of blood infectious diseases. Section 2.3.2 considers Specification Transformation Expert System (STES). In section 2.3.3, a Knowledge Based Approach for Facilities Location Planning (KBAFPLAN) is reviewed. In section 2.3.4, EXPRIM (Expert System to Retrieve Images) is reviewed. Sections 2.3.5 and 2.3.6 respectively discuss knowledge Based Server for Valuation of Assets (KBSVOA) and Computer Aided System for Investigation of Crime in developing countries (CASIC). The Prospector is discussed in 2.3.7

2.3.1 Computer Based Medical Consultations: MYCIN

A lot of works are currently being carried out on the application of computers in medicine. [Shortliffe, 1976; Trayner ,1984; Cookson *et al* ,1984; Jackson, 1986; and Akinyokun ,1991], all address the subject of computer aided medical consultations.

MYCIN is one of the oldest and currently, the most popular expert system used for medical diagnostics. It was developed at Stanford University in the U.S.A. and reported extensively in [Shortliffe , 1976; and Jackson ,1986]. It is used to assist doctors with advice on diagnosis and treatment of bacterial blood infections.

2.3.1.1 Motivation

MYCIN was motivated by the need to assist the medical expert in the tedious and complicated task of diagnosing and providing treatment for bacterial blood infections. The task is further complicated by the fact that the human body is often populated by bacteria and that samples from sterile sties (for example, blood and cerebrospinal fluid) may be contaminated subsequently in the laboratory. Often doctors, not being able to identify an appropriate drug, wrongly prescribe drugs (as a trial and error approach) and in so doing, create room for resistant strains of bacteria [Jackson, 1986].

2.3.1.2. Objective

The central objective of MYCIN is to assist a doctor who is not an expert in the field of antibiotics in the diagnosis and treatment of blood infections.

2.3.1.3 Methodology

MYCIN is a production rule based system that is built around the following components:

a. A consultation system.
b. An explanation system.
c. A rule acquisition system.

The consultation system consists of the following:

a. A rule base.
b. A set of static and dynamic data structures.
c. A control structure.

It is responsible for generating a set of hypotheses with respect to the offending organisms and making therapy recommendations based on these hypotheses. A rule is a premise-action pair. Premises are conjunctions of conditions, while conditions are predicates, which evaluate the truth or falsehood with some degree of certainty. Rules as well as data have a numerical weight (called tally) associated with them. This numeric weight (ranging from -1 to +1) is meant to reflect the confidence in the application of a given rule. The degree of

confidence in the conclusion will be a function of the tally, the rule and combined certainties of data matching the condition of the rule.
MYCIN has a top-level goal rule, which defines the whole task of the consultation system, that is, consultation system is essentially a backward chaining production system. It reasons from the problem statement to relevant facts, which give the values of clinical parameters, via rules, which relate conclusions to evidence in the context of cultures and organisms. If there is an organism, which requires therapy and consideration has been given to the possibility of additional organisms requiring therapy, THEN compile a list of possible therapies, and determine the best therapy in this list.

The consultation system may request for items of data from user as at when they are needed for the evaluation of a condition in the current rule. The selection of therapy takes place after a diagnostic process has run its course. Such therapy selection consists of two phases - selection of candidate drugs and then choosing preferred drug(s) given a particular situation.

The explanation system allows the user to interrogate the system about the consultation, as well as ask more general questions. It is automatically invoked at the end of a consultation and may also be accessed during the consultation itself. MYCIN maintains a record of the decisions it makes and uses this record to explain and justify such decisions when questions are asked about them. In reply to question about its decision, MYCIN cites the rules that it applies, its degree of certainty in that decision, and the last question asked.

The rule acquisition system of MYCIN is centered around the fact that MYCIN allows an expert to enter a new decision rule or change an existing rule. The user can enter the rules in the English language for display and easy readability purposes, and the program will translate them into the corresponding LISP representation. There are also facilities for determining the effects of adding a new rule to an existing set.

2.3.1.4 Evaluation of MYCIN

MYCIN has been considered as being effective for the following reasons:

a. It is typical of a broad class of consultation programs, which perform diagnosis and offer advice.

b. It has given birth to a family of related programs, which are either modelled on MYCIN or complementary to it.

c. To an extent, it satisfies the criteria for realistic complexity. The need fulfillment, high performance, reliability and usability, that are associated with a successful expert system, are all present in MYCIN.

However, [Jackson, 1986] observes that MYCIN cannot be used in the wards in its initial form for the following reasons:

(a) Its knowledge base does not cover everything in the spectrum of infectious diseases, so it is incomplete in a sense.

(b) Most hospitals can not afford the computing power required to run a MYCIN.

2.3.2 Specification Transformation Expert System

Specification Transformation Expert System (STES) is discussed in [Tsai and Ridge ,1988]. It is an expert system, which transforms requirement specification to design specification in software engineering. It accepts as input, software requirement specification in the form of data flow diagrams and translates the specification into a template describing a structure chart.

2.3.2.1. Motivation

Software development is a knowledge intensive activity. Often times, the process takes a long time when done manually. In some cases, the designs are poorly made, such that user's specifications are not met. There is therefore, the need for a knowledge based software assistant that would provide a programming methodology, better suited to solving specification transformation problems. Such a system reduces financial and other costs associated with faulty and delayed designs.

2.3.2.2 Objectives

The objectives of STES are:

a. To transform requirement specifications to design specifications during the development phase of a software life cycle;

b. To allow incremental accumulation, and timely updating of design expertise which results in a sizeable reduction of costs for designs of succeeding software systems.

2.3.2.3. Methodology

STES is divided into three components namely: Data storage, knowledge base and inference engine. The data storage component is a global database of symbols representing facts and assertions about the problem. It is the working memory that holds the knowledge that the entire system can access. The knowledge base includes the set of actual production rules, each having a condition and an action part. The production rules set conditions for changing data configuration and giving instruction for changing the data configuration. The condition part is called the left- hand side, while the action part is the right hand side. The inference engine is an executor, that determines which rules are relevant to a data memory configuration and chooses the one to apply. The inference engine's reasoning mechanism has three phases:

a. Match; which inspects the left side of all the rules against the fact in the working memory to see which, if any, are satisfied.

b. Conflict resolution; which decides which rule will be more appropriate, if more than one rule is eligible.

c. Act; which executes the right side of the production rule selected.

The transformation of STES follows four stages:

Firstly, it identifies the flow of data in the problem domain and then constructs an accurate specification using data flow diagrams. Secondly, it identifies the afferent, efferent and transform - centered components. Afferent data

components are those components that are used as input into the system. They are high level components of data. Efferent data components are high level components that constitute outputs of the system. The transform centered components contain the systems essential functions which are independent of any constraints imposed by any particular implementation. Thirdly, the efferent, afferent and transform centred components are factored to form a hierarchical program structure. The structure is the first structure chart and specifies a good design for the resulting system. Fourthly, the structure chart is refined and optimized to improve the design generated in the third step. The step transforms good design into an excellent one using the two kinds of knowledge in the knowledge base. It generates a structure chart template, which is now transformed into data flow diagram.

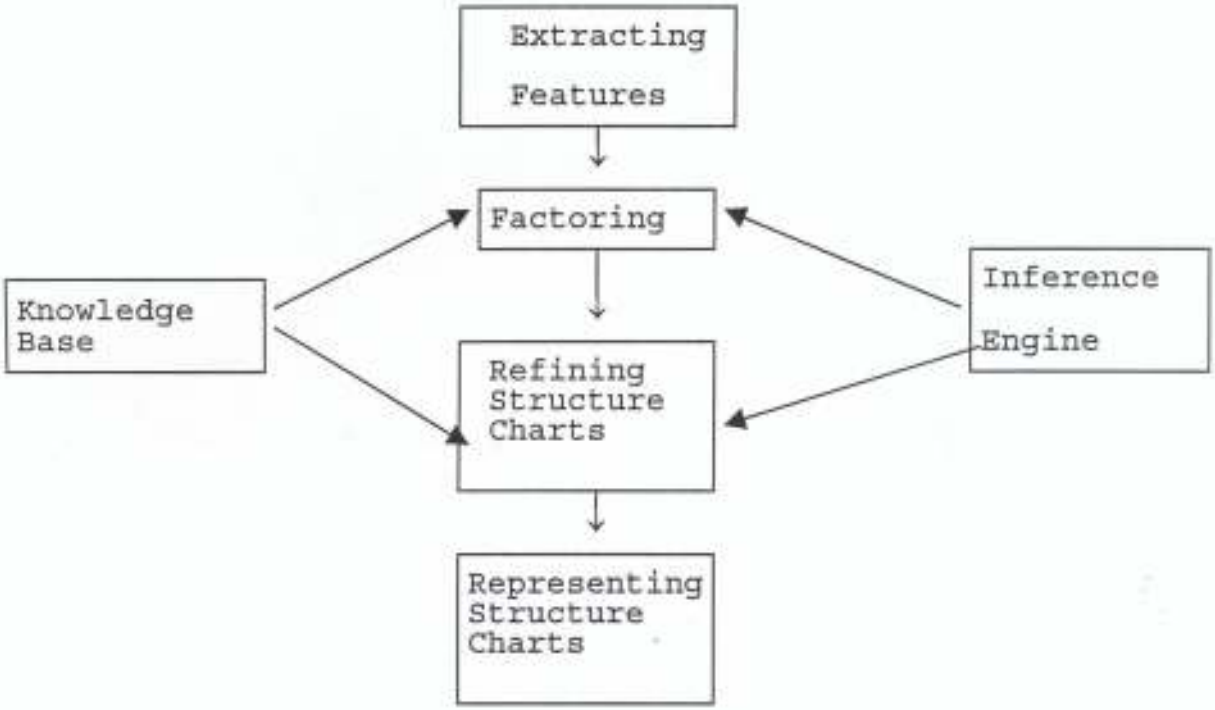


Figure 2.3 Phases Required in Transforming Dataflow Diagrams to Structure Charts.

2.3.2.4 Contributions

STES provides a framework for the incremental accumulation of design experience and provides a veritable tool for the automation of software development. Furthermore, STES can be used as a training tool for novice

software engineers that are learning structured design. It also provides the software engineer a rough guess about the final structure of the system being designed.

2.3.3 Knowledge-based Approach for Facilities Location Planning

Knowledge-Based Approach for Facilities Location Planning (KBAFPLAN) [Arinze and Barnerjee, 1990], is a system that assists the operations planner in locating new facilities.

2.3.3.1 Motivation

An operations planner wanting to locate new facilities would have to contend with a multiplicity of potential models that might be used; choice here, becomes a problem. Secondly, while major location criteria are quantitative, others are qualitative or fuzzy, thus making them more amenable to symbolic rather than procedural solution. A knowledge system is therefore necessary in order to assist the location planner in dealing with the explosive number of models and cope with the symbolic nature of some of the decision variables.

2.3.3.2 Objectives

The objectives of KBAFPLAN are:

a. To help in the selection of a location model.

b. To improve the solution arrived at by a procedural model by refining it, using additional symbolic knowledge or heuristic that represent less tangible components of the decision.

c. To provide ability to search through large solution spaces, to reduce the computational requirements.

2.3.3.3 Methodology

Location planning seeks to optimize some spatially dependent objectives like operating cost, capacity/volume at each location, distance metric, travel time cost, and so on. The knowledge obtained from facilities location is represented in the form of facts and rules, which are deterministic, based on their clear cut description. A further iteration of knowledge elicitation may lead to the use of probability or certainty factors. The extracted rules are represented in the form of decision table. The user - entered characteristics are used to match, and select the appropriate model. Using Prolog's back tracking mechanism, the system intelligently restricts the number of options to be considered. It equally adopts the use of inference tree to finally arrive at options that could greatly optimise the parameters in question.

2.3.3.4 Evaluation of KBAFPLAN

KBAFPLAN as proposed in [Arinze and Banerjee, 1990] is expensive in terms of developmental resources. This is due to the large number of models, criteria and subsequent rules involved. Furthermore, the firms need to keep a large repertoire of models in its model base, which could be expensive for smaller organizations. Such an organization could use simulation language for modelling (SLAM) which will enable them to quickly build a variety of models.

Furthermore, is the need for a sophisticated user interface that will allow the

user set constraints for the expected solution. Expertise in any logic base language (for example, PROLOG) is needed, and also the ability to import data into the prolog's environment from traditional database or procedural location modelling system.

2.3.4 Expert System to Retrieve Images

Expert System to Retrieve Images (EXPRIM) [Crenhange *et al* ,1984], is a system that helps a user in retrieving images according to the user's specifications.

2.3.4.1 Motivation

Teachers, reporters, publishers, and some other professionals, may need to use pictures to illustrate an idea. There are several pictures to choose from. But often, the user is not able to get a satisfactory picture because of inadequate description on the part of the user. Consequently, the DBMS tool alone is inadequate for handling 'pictorial' databases and that necessitates the need for an expert system.

2.3.4.2. Objective

The objective of EXPRIM is to help users retrieve images from a bank of pictures according to the user's specification.

2.3.4.3. Methodology

EXPRIM consists of the following components:

a. Work Station and Visualization Manager, which is a computer system with an alphanumeric screen and a pictorial screen.

b. The pictorial base where in pictures may be stored in different materials such as numerical disk, optical numerical disk and video disk. A picture may be identified through its reference number.

c. The descriptive base where pictures are described alphanumerically to permit their retrieval for user-queries.

d. The Data Base Management System, which manages the descriptive base.

e. The knowledge base, a principal component of EXPRIM, which contains information about the following:

   i. the vocabulary used to describe the pictures,

   ii. the area illustrated by the pictures, and

   iii. reasoning rules.

EXPRIM helps in query initial formulation, query processing and query automatic reformulation. A typical query initial formulation, which involves a journalist is as follows:

> A journalist is interested in obtaining information about someone say, Mr. Ado, who has just been appointed a Minister. Furthermore, the journalist wants to write an informative article on the Minister.

Firstly, he (the journalist) gives a simple query asking the system to give a picture of Mr. Ado. The result is nil, meaning that he is unknown to the system.

Having successfully done the query initial formulation, the system proceeds with the query processing as follows: The system asks for more information (residence, age, profession, and so on, concerning Mr Ado). The user tells the system that Mr. Ado is a lawyer. Then, the system may produce about a hundred pictures about official activities of lawyers. On visualization, the user recognizes Mr. Ado on 25 events.

The query automatic reformulation then follows. The system on investigations (using the descriptive base) finds out that in a great number of selected pictures, there is a well known teacher, Dr. Faditi and continues to search for other pictures of Dr. Faditi. The system considers a second hypothesis that Mr. Ado and Dr. Faditi, have something in common.

On further investigations and search, it may be discovered that Mr. Ado was a law lecturer in the University. It continues like that until almost every pictorial information is found about Mr. Ado.

The user now asks the administrator system to include the name of Mr. Ado in the lexicon and let it appear in the descriptions of the pictures on which Mr. Ado appears.

2.3.4.4 Contributions

EXPRIM forms a good framework for the development of computer tools that aid query processing. This stems from the ability of EXPRIM to carry out query

initial formulation, query processing and query automatic reformulation. Also, EXPRIM forms one of the earliest tools for `pictorial journalism', an aspect of journalism that emphasises the use of pictures in news reporting. It allows the journalist to dig into the historical perspective of an event via pictures.

2.3.5. Knowledge Based Server for Valuation of Assets

The Knowledge Based Server for Valuation of Assets (KBSVOA) [Akinyokun ,1991; Arekete, 1995; Akinyokun and Arekete,1996], is an expert system that aids the Estate Surveyor and Valuer in the valuation of assets.

2.3.5.1 Motivation

Every corporate organisation today, has a number of assets, which need to be valued from time to time to determine their market value, insurance value or mortgage value.

Currently, the estate valuers engage in manual procedures for the valuation of assets. The manual procedure has the following shortcomings:

a. When the cost elements involved in asset valuation are large in number, the combinatorial problem of valuation may assume an exponential growth, which may be explosive using the manual approach.

b. The level of complexity and intensive work required in asset valuation makes the experts in the field of asset valuation grossly incapacitated, using the manual method.

c. Slow process of asset valuation and presentation of reports are major characteristics of the manual method of asset valuation.

KBSVOA is designed to overcome of the shortcomings enumerated above. It ensures that valuation jobs are completed faster. It also ensures the maintenance of standards and high reliability.

2.3.5.2. Objectives

The objectives of the valuation system are:

a. To provide an intelligent menu-driven and user friendly interactive system. This may guide the Estate Surveyor and Valuer at the various stages of valuation of assets with the view of enhancing his performance.

b. To provide means for self-education of estate valuation by the estate surveyor and valuer, students of estate management or any private individuals that may be interested in the valuation of assets [Arekete, 1995].

2.3.5.3 Methodology

KBSVOA was designed and implemented to support the storage and intelligent processing of the knowledge acquired by the estate valuer in the domain of estate management and valuation. The valuation system has three principal components, namely the estate surveyor and valuer, assets, and computer system. The computer system is composed of a knowledge bank, an inference engine, a decision support system, and a user friendly interface. The computer system acts as a tool which guides the human component, the estate surveyor and valuer intelligently at the various stages of valuation of assets, present alternative decisions, offer advice, but leaving the ultimate decision to the

human component to take.

The knowledge base is composed of a network of semantically related structured (static) and experiential knowledge of assets and their valuation. The static knowledge, also called the data base, is conceptualized as a network of relations where each attribute of each relation describes a temporal characteristic of assets.

KBSVOA adopts a forward chaining technique of drawing inference from the knowledge base. It chains forward from those conditions that are known to be true, and moves progressively towards conclusions. It attempts to match the attributes of the various relations of the database, bringing to bear the experiential knowledge of the estate surveyor and valuer, with the view to obtaining a realistic market value, insurance value and other related parameters as it concerns the assets under review. KBSVOA was coded using Paradox 3 Relational Data Base Management System.

2.3.5.4. Contributions

KBSVOA is one of the most recent researches in the area of computer aided asset valuation. It assists the asset valuer in reducing the bottlenecks associated with the manual method of asset valuation.

The capabilities of KBSVOA are:

a. Generating three different market or insurance values of an asset.

b. Serving as a tool for carrying out sensitivity analysis of assets valuation.

c. Generating the history of maintenance and values of assets.

d. Generating a realistic estimate of a project to be executed, which can be favourably used as a reference frame for quotation submitted by

contractors.

2.3.6. Computer Aided Investigation of Crimes in Developing Countries

Computer Aided Investigation of Crimes in Developing (CASIC) [Akinyokun, 1988], is a framework for the use of computers in the investigation of crimes in developing countries. The case study of bank robbery is carried out and some conclusions are drawn.

2.3.6.1. Motivation

Every nation has a department within its Police Force, which is charged with the responsibility of criminal investigation. The department relies primarily on the information collected from complainants, witnesses and existing records of criminal cases in an attempt to investigate a case on hand.

The existing records have to be searched in order to find out whether a crime just committed and under investigation can be related to some cases in the past. The existing records are often kept piecemeal in file cabinets in developing countries. The manual file system lacks standard procedures for data formatting, storage, retrieval, maintenance and documentation.

Furthermore, there is no central control, thus data security and privacy can not be guaranteed. The processing of the manual file is usually slow and a tedious task, particularly when the population of records to be searched is large. The time lag between the time a crime is committed and that by which the investigation is completed is usually long. There is a chance of justice being switched unduly in the long process, after all, justice delayed is justice denied.

The shortcomings enumerated above motivated the work on CASIC.

2.3.6.2 Objectives

The objectives of CASIC are:

a. To provide an intelligent computer based system that would enhance the performance of the human expert int he area of crime investigation.

b. To provide a system for computer aided learning of criminal investigation.

2.3.6.3 Methodology

The author took a study of different types of crimes and attempted to take a case study of bank robbery. He took a study of the knowledge representation of bank robbery using frame (semantic network). He proposed a framework for investigating bank robbery and the framework has five levels as follows:

a. The source or the starting point for the investigation.

b. The robbery target which could be customer, cashier, courier or strong room.

c. The internal suspects that may be connected with the bank robbery. They include the bank manager, bank accountant, ledger clerk, others.

d. The external persons that may be connected with the robbery. This could include the police, courier driver, gate man and robbers caught in the scene.

e. The exit point of the investigation.

The case history is presented as being the major component of the experiential

knowledge for the system. The case history is described by the bank robbed, robbery target, mode of attack, personal data of complainants, suspects, witnesses and culprits, investigation procedure and judgement.

The study proposed an inference engine coded in hierarchically structured modules using the IF-THEN clause of Fortran 77. The process of making inference starts with a navigation that first 'hits' the robbery targets. Depending on the facts generated from the target and the nature of the attack, the navigation moves to the immediate suspect, which would determine the next suspect to get to. This is done until substantial evidence is generated to prove the culprit of the robbery. In deciding the actual culprits, a weighing function, based on the principle of probability distribution of the decision extracts from the case history is built into the inference engine. The navigational path that is favoured by a decision extract with the highest weight is considered valid and true.

The user interface of the proposed system is based on pseudo-natural language, coupled with a menu-driven facility. The user gains access to the system through a point, and chooses bank robbery as an option under 'crime of interest'. The system always guides the user but at the same time, allowing him (the user) to take the final decision.

2.3.6.4. Contributions

CASIC succeeds in showing that there are many alternative paths that can be taken in the investigation of bank robbery. The alternative paths are modelled using the concept of semantic network. Secondly, CASIC provides the

mechanism for the intelligent interactive processing of the corresponding semantic network of crime and the history of existing cases. The interactive processing considers a number of key factors, which can be related, weighed and alternative deductive reasoning evaluated with the intention of identifying the set of culprits involved in the given case. Lastly, and most importantly, CASIC serves as a good starting point to what may be a very useful system for legal processes in practice.

2.3.7 The Prospector

The Prospector is reported in [Bishop, 1987]. It is an expert system, which was developed by the United States Geological Survey in conjunction with an international organisation known as SRI international. It is used in geological survey and oil exploration.

2.3.7.1 Motivation

The process of evaluating geological resources in a region is a cumbersome one. Often times, it takes a lot of time and in some instances, is characterised by inadequate information concerning the site. The particular oil deposits at a given site may not be adequately assessed. To that effect, a drilling activity could be planned for a site that does not contain enough oil deposit. In the process, huge amounts of money are wasted.

It is therefore necessary for a knowledge based system to be developed in order to assist in resource evaluation, site identification and site selection in geological activities.

2.3.7.2 Objectives

The objectives of the Prospector are as follows:

a. To assist in the evaluation of geological resources in a region.

b. To check for certain oil deposits at a site.

c. To select the best sites for oil drilling.

2.3.7.3 Methodology and Contributions

Prospector uses a set of models, one for each investigation. Items of knowledge are stored as spaces in a model, with an associated probability. The spaces are connected by rules, which have two numerical factors that determine their strength.

An analysis starts with the construction of a model to suit the investigation to be carried out. At the outset, many of the probabilities are unknown or are very low. As the analysis proceeds, the values of the probabilities are updated. An inference mechanism consisting of a set of production rules is used. It refers to a semantic network of basic geological knowledge in order to decide the sequence of rules to apply. The user interface is interactive. Either the user or the expert system can initiate steps, by asking questions or supplying information. At any stage, the user can ask Prospector to explain its current line of reasoning or intermediate conclusions.

Prospector has proved its worth in exploration especially oil exploration. The cost of the computer system, [Bishop, 1987] reports, is a very small fraction of the costs of drilling a test well, and improved siting of production well brings in greatly increased revenue.

2.4 PATTERN MATCHING

Everyday in life, human beings engage in the process of pattern matching. This is so because when the sensory organs (eyes, ears, nostrils) encounter a new phenomenon, the pattern established by that phenomenon is impressed upon the brain. When next such a phenomenon is encountered, the brain processes the new observation, matching it with the pattern that already exists in the brain. Such a matching process is necessary in order to assist the individual in understanding the situation in a better perspective and taking action(s) based on previous experience.

A typical pattern matching situation is as follows : Take for instance, that one's uncle has a white Mercedes Benz car. Constant seeing of that car makes a pattern in the person's brain. When next he sees a white Mercedes Benz car, he tries to match the patterns made by the car with the one already existing in his brain. In processing the pattern, the brain considers the shape of the car and the driver of the car. If the shape matches the existing shape but the driver of the car is different, then further questions could be asked regarding the driver of the car. The query formulation and processing will continue until a conclusion is arrived at. Such a conclusion could be that the car was stolen by another fellow. Based on that, a decision may be taken, to contact the Police. Pattern matching involves perception, which has two aspects. The first aspect is the process by which the external stimuli are actually received by the organism or machine, while the second aspect is the process of processing the signals to extract meaningful information. [William, 1989] observes that people

do not actually see objects; rather, they see patterns of lines, angles, light shadow, texture, shapes; and it is the duty of the brain to sort this chaos of signals into a coherent order. The brain takes a decision on the patterns, based on previous situations, on information sent from other sensors and also on ideas that the brain has about the world around it.

Many aspects of information processing involve pattern matching. The pattern matching problem is characterised as a searching problem with the pattern as the key. [Sedgwick, 1988] notes that it is often desirable to do string searching with some what less than complete information about the pattern to be formed. For example, word processors contain a program, which consists of a dictionary of patterns (that is, character strings). The program compares each word in a processed text against the nearest entries in the dictionary. If it finds a pattern that matches exactly, it regards it as a correct spelling and moves to the next word. If it can not find an exact match, it displays all these patterns that nearly match the word on the screen for the user to make a possible selection from.

CHAPTER THREE

ANALYSIS OF THE CONVENTIONAL METHOD OF PERSONNEL EMPLOYMENT PROCESS

In this chapter, the manual method of personnel employment in corporate organisations is analysed. Section 3.1 discusses employment planning, the need for employment planning and how it is carried out. In section 3.2, the recruitment process is discussed. In section 3.3, the limitations of the manual method of employment are highlighted.

3.1 EMPLOYMENT PLANNING

Planning is the most basic of all management functions. It is the starting point from where all subsequent activities will develop. Planning is deciding in advance, what to do, why it should be done, who should do it, where it should be done, and how it should be done. It involves identifying organisational objectives and selecting policies, procedures and methods, designed to lead to the attainment of those objectives.

Employment planning or human resource (HR) planning is a management process that involves analysing an organisation's human resources needs under changing conditions (internal and external) and developing policies and strategies to satisfy these needs. It is a process of ensuring that an organisation has the right type and number of personnel at the right time and place. It ensures that the manpower needs of the organisation are met adequately and effectively. The entire manpower procurement process starts with the initial planning, wherein decisions are taken about how many

applicants to be employed, which skills the applicants must possess and when they will be required. This planning takes into consideration the budget, infrastructure and vacant positions of corporate organisations.

Every organisation has its strategic decisions, which involve long term plans about organisational objectives. It also involves the analysis of strategic opportunities and risks facing the organisation and the effective utilisation of resources (human and material) to achieve the organisational objectives. An off-shoot of the organisational strategic decisions is the human resource strategic decision. It involves the identification of the human resource implications of the organisation's strategic decisions. The human resource strategic decisions lead to employment planning. Figure 3.1 depicts the interrelationship among the organisational strategic decisions, human resource strategic decisions and employment planning.

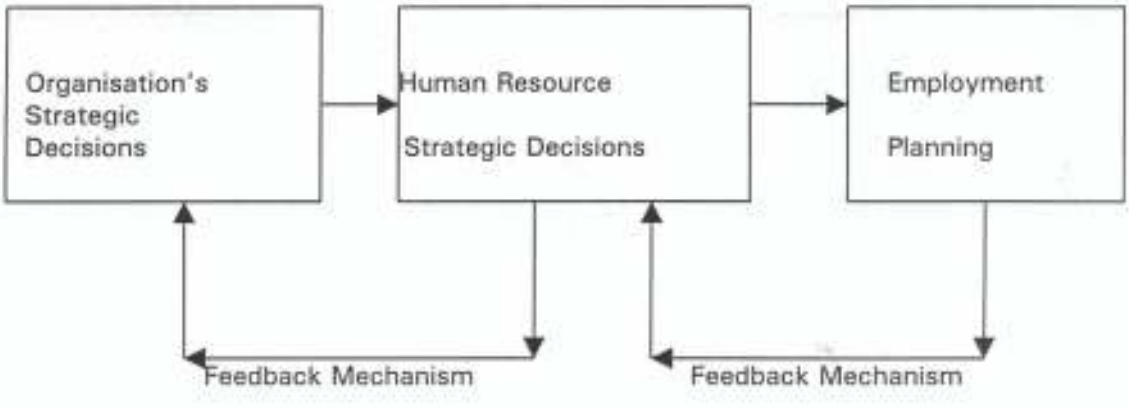


Figure 3.1 - Interrelationship among overall strategic decision, HR strategic decision, and employment planning.

Human resource activities follow the traditional management functions of planning, organising, directing and controlling. Human resources management activities include manpower procurement, training, compensation, integration,

maintenance, separation, evaluation and control. Figure 3.2 exhibits the human resource management model mostly used in corporate organisations. The major goals of human resources planning are:

a. Estimation of the future demands for employees.

b. Comparison of the expected demand with the current workforce.

c. Determination of the shortages based on organisational objectives.

3.1.1 Importance of Employment Planning

Employment Planning is necessary for the following reasons:

a. It ensures that the right number (quantity), kind (quality), skills and ages of personnel are available at the right time and places in order to achieve the long run and short run goals and objectives of the organisation.

b. It provides an efficient and effective use of employees at work. Since employment planning precedes all other human resource activities, it shows that personnel efficiency depends on answers to questions about how many people have the required skills and experience.

c. It provides a means for an effective personnel development and greater sense of fairness to the employees. Organisations with good employment planning systems involve their employees in planning their own careers and sharing in training and development experience, thus, providing a fair and equal treatment for the employees.

d. It enables an organisation to avoid unnecessary layoffs,that is,it ensures a gradual process by which an organisation is able to adapt its HR needs to its level of operation in a fairly systematic manner. This is done through retraining and redeployment of employees.

e. It ensures smooth succession in the hierarchy of the organisation, and adequate lead time for firing, hiring and training.

f. It ensures equal employment opportunities (EEO), especially for women and those who are not 'well connected'.

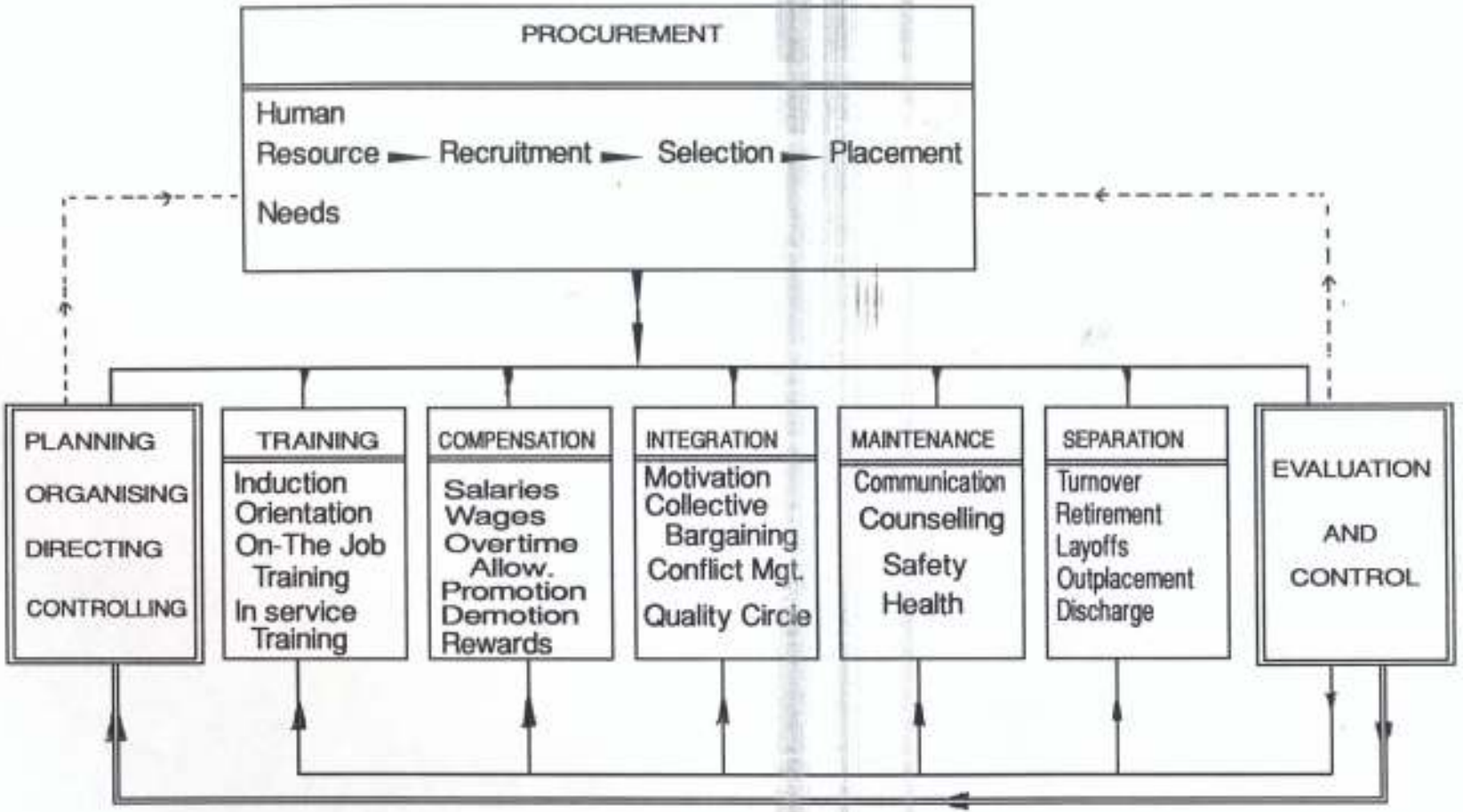


Fig. 3.2 Human Resources Model

3.1.2 The Phased Analysis of the Employment Planning Process

Employment planning involves the following basic phases of analysis:

a. Demand Analysis.

b. Internal Supply Analysis.

c. External Supply Analysis.

The three phase planning model proposed in [Milkovich and Boudreau, 1990] is shown in figure 3.3.

Demand Analysis

This is the process of determining the quality and quantity of employees required by the organisation in order to meet the organisational goals. It takes into consideration the following:

a. Organisational conditions which include the organisational objectives, available vacancies, and the existence of infrastructure.

b. Marketing Plans of the organisation, bearing in mind its market share and level of competition.

c. Financial plans of the organisation. This includes the budget and any other financial plan.

d. Operational plan of the organisation; whether the organisation wants to maintain its level of operation, reduce or increase its level of operation.

e. Technological plans of the organisation, which takes cognisance of the level of technology available to the organisation, and any intended expansion in the company's level of technology.

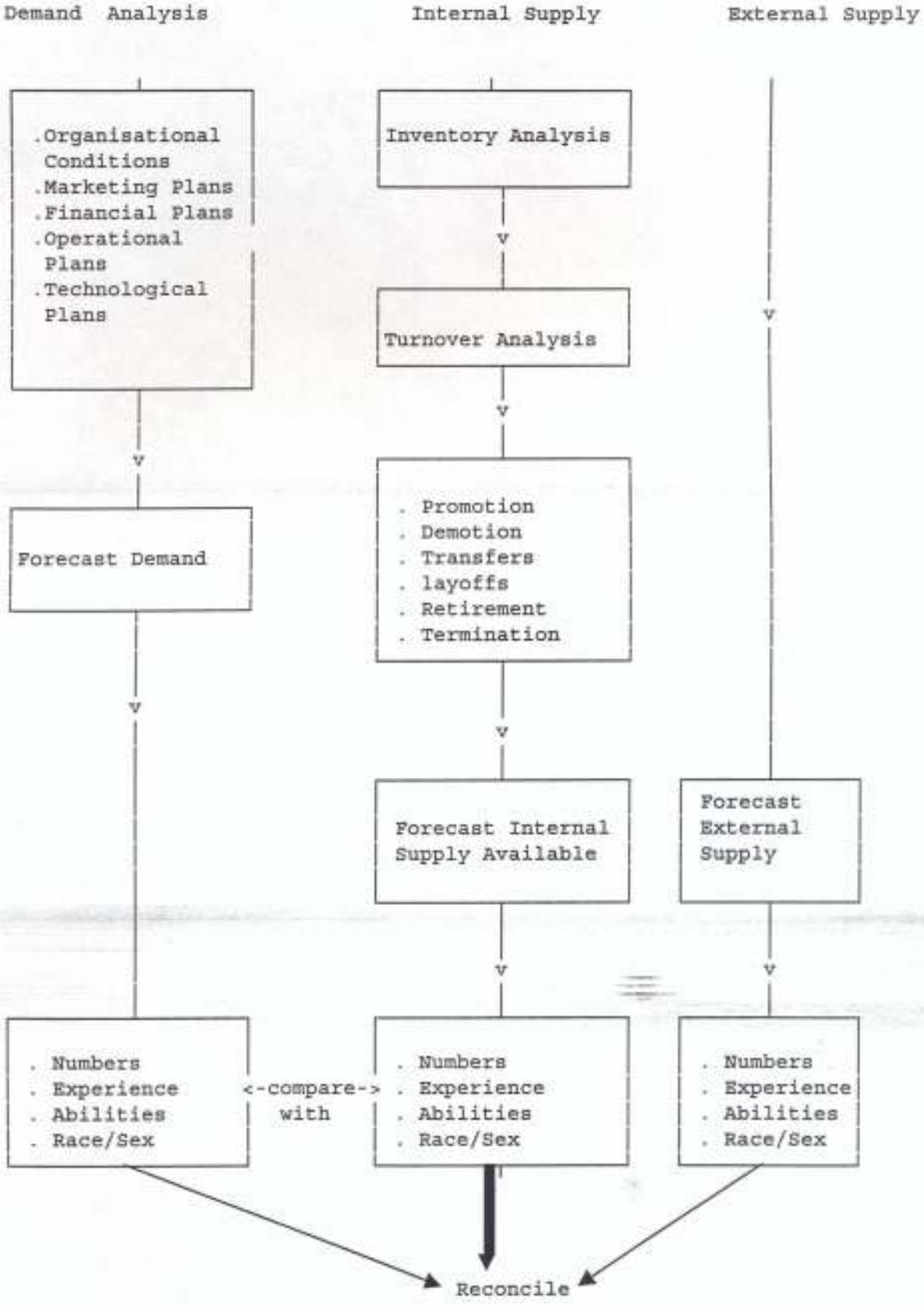


Figure 3.3 - Employment Planning Process

Based on the above considerations, the organisation forecasts its human resources demand in terms of the following:

a. Number of employees required.

b. Expected level of experience required by the employees.

c. Abilities of the employees in the given job domain.

d. Race/sex and any other requirement in respect of the job positions.

Internal Supply Analysis

In forecasting the internal human resources supply within the organisation, there is the need to carry out the following:

a. Inventory analysis, which answers such questions as,

   i. what is the stock of human resources that is internally available;

   ii. what levels of education do the employees possess; and

   iii. what levels of training and experience do they possess.

   iv. What levels of training and experience do they require

b. Turnover analysis, which considers the number of human resources that will be available during the planning period. It takes the following parameters into consideration: Promotions, demotions, transfers, layoffs, retirements and terminations.

Based on the analyses discussed above, the organisation forecasts its internal human resources supply in terms of numbers, experience, abilities, race/sex, among others.

External Supply Analysis

After considering its available human resources relative to the vacant positions, the organisation forecasts its external supply based on one or more of the following criteria:

a. Statistical figures existing in relation to unemployed appplicants in the given disciplines.

b. Previous or existing applications sent to the organisation in relation to the given jobs.

c. Management's *apriori* judgement on the availability of the required professionals in the job market.

Based on the analysis carried out in relation to the external supply, management forecasts its external supply of human resources. The external supply attempts to bridge the gap between demand and internal supply.

Reconciliation of Demand and Supply

When demand and supply forecasts have been made and compared, management tends to take decisions on whether to retain the current human resources situation, reduce the number or increase the number. If the demand for employees and the projected supply, match, (which is very rare), it is possible that the distribution of employees among different positions with various skills, or in various departments may not match. The balancing process may involve transfers, promotions, demotions and even retraining of employees.

If the supply is lower than the demand, then several actions are possible. In a case where the shortage is small and the existing workers are prepared to do overtime, then the present employees could be used to fill the gap. If the shortage is of higher-skilled employees, then training and promoting present employees could be necessary while at the same time, recruiting lower skilled workers. Already laid off staff could be recalled, additional employees can be hired, or some of the work be contracted out.

There could be surplus situation, which may have resulted from business decisions like poorly designed or marketed product or declining market conditions. Employers try to avoid layoffs of surplus employees; rather, they encourage older employees to make early retirement.

If management decides to employ new personnel to fill in some shortages, it follows the employee recruitment process, followed by selection and placement.

3.2 EMPLOYEE RECRUITMENT PROCESS

The decision to recruit new employees is based on demand-supply analysis, coupled with the consideration of organisational constraints in terms of budget, office space availability and other requirements. Having determined the number(s) and type(s) to employ, the organisation goes through the recruitment process as is modelled in figure 3.4.

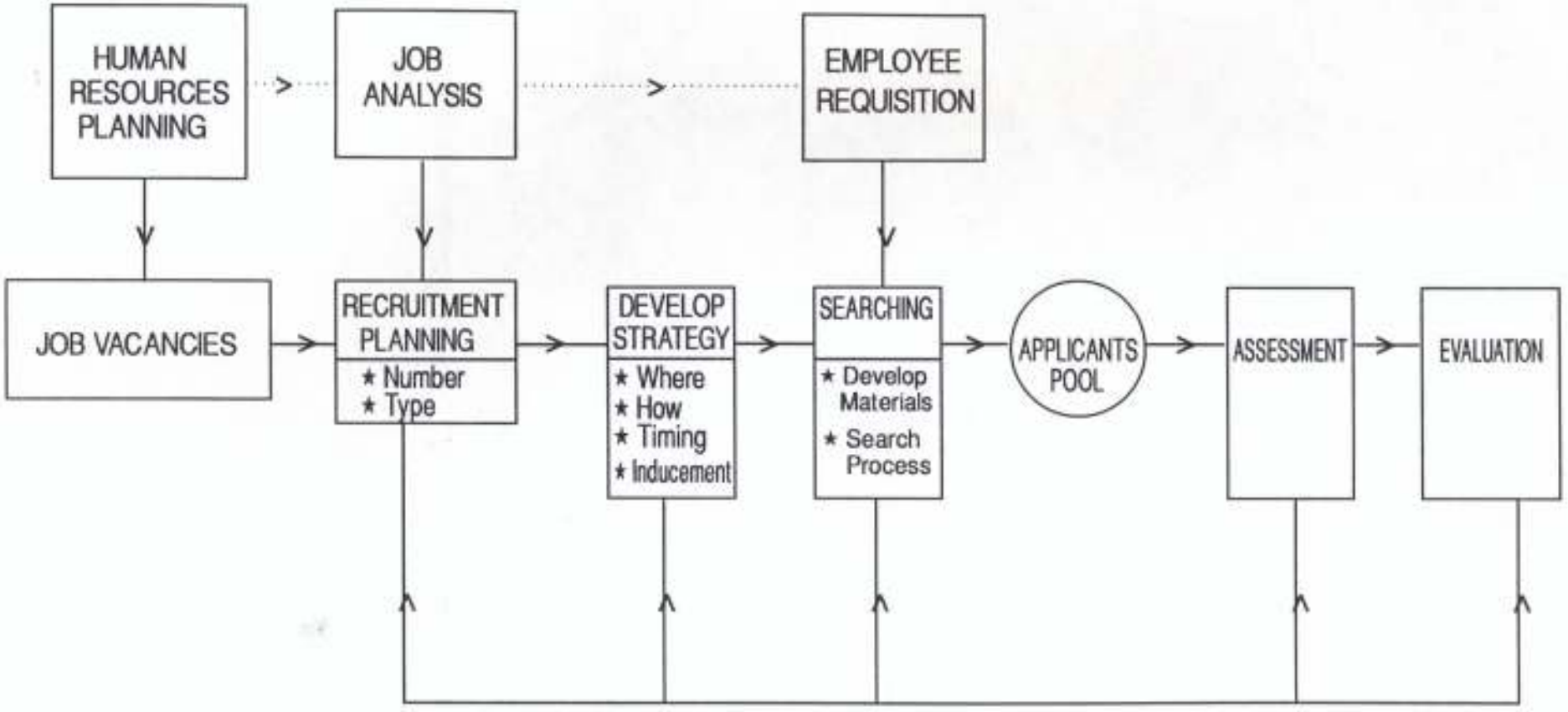


Figure 3.4 - Employee Recruitment Model

Human Resources Planning, results in the determination of job vacancies. It also results in Job Analysis. Job Analysis is the process of studying and collecting information relating to the operations and responsibilities of a specific job. The immediate products of this analysis are job descriptions and job specifications.

3.2.1 Job Analysis Process

The process of job analysis is essentially that of data collection. It can be done through one or more of the following means:

a. Questionnaire administered to staff on ground and specialists.

b. Written narratives on the job by staff on ground.

c. Observation of the worker on the job.

d. Interviews conducted on staff on ground and specialists.

However, the interview is a prime method of data collection. An interview enables one to obtain detailed information about objectives, constraints and task specifications of a given job. A good interview has to be carefully planned and the interviewer has to be definite about the following:

a. Whom to interview.

b. When to interview.

c. What to ask.

d. Where to hold the interview.

In planning an interview, the interviewer must always be considerate to the interviewee and decide what is most convenient/easiest for the interviewee. He should be able to make the interviewee feel at ease by making him (interviewee)

feel that the ideas he gives are important. There has to exist a relationship of confidence established. In conducting an interview, some specific information are expected to be generated. The interviewer should aim not to leave without such information. A good interview involves the following:

a. Formal introduction of the interviewer and interviewees.

b. Formulation of simple and complete questions.

c. Proper documentation of the questions and answers.

d. Flexibility on the part of the interviewer.

e. Avoidance of sentiments.

Two major documents are often produced during the process of job analysis. The documents are:

a. Job Description.

b. Job Specification.

Both documents are used for the following procedures:

a. Training of Employees

b. Job Evaluation

c. Employee Performance Appraisal

d. Career Development

e. Induction of New employees

f. Employee Counselling

g. Labour Relations

h. Job Re-engineering

Job Description

The documentation of job description is an organized factual statement of the duties and responsibilities of a specific job. It tells what tasks to be done, why and how the tasks are to be done. It specifies the duties to be performed, working conditions, machines, tools, responsibilities, and so on. Generally speaking, job description has the following components:

a. Job identification

b. Job summary

c. Duties performed

d. Supervision given and received

e. Relation to other jobs

f. Machines, tools and materials used.

g. Working conditions

h. Definition of unusual terms

i. Comments that add to and clarify the above.

Given below, is an example of job description:

a. Name of Organisation: JoJo Associates (Nig.) Limited

b. Address of Organisation: 1, Oguta Street, Onitsha, Anambra State

c. Job Title: Company Secretary

d. Relation to Other Jobs:
   - Responsible to the Managing Director (MD)
   - Gateway for all information from the

MD to other people.

- Covers the deliberations of the Board of Directors.

e. Summary of Job: Performs variety of secretarial and administrative duties including taking minutes of top management meetings, handling external correspondence, and specialised information, liaising with the company lawyer on legal matters.

f. Equipment Used: Photocopier, air-conditioners, refrigerator, fax machine, typewriter.

Job Specification

This is a statement of the minimum acceptable human qualities necessary to perform a job properly. It is a statement of the employee's characteristic in terms of knowledge, skill and experience, which are necessary to perform the job effectively. If one takes a look at, say, the job of a technical salesman selling lubricants, the job specification could stipulate the requirement of at least, a degree in Industrial Chemistry because he would have to interact with knowledgeable people in chemicals. He also needs some training in the act of selling and some personal qualities.

Job specification is often the result of some managerial judgement, or some experience or task specification that is already in existence. However,

management should be explicit in defining the job requirements. For instance, the requirements should be classified as "mandatory" or "optional". If mandatory, one should specify the following:

a. If the attribute is basic or advanced in nature

b. If it is a pre-employment attribute or on-the-job attribute

If the characteristic is described as optional, one indicates its level of importance to job performance. For instance the requirement that a computer analyst "understand the computer software currently in use" is described as:

a. Basic knowledge

b. Mandatory knowledge

c. Possessed at entry to the job.

3.2.2 Development of Strategy

The job analysis aids recruitment planning as it also suggests the number and types of employees needed. It also takes into consideration, the ability of the organisation to employ such staff. At this point, a strategy is developed as it concerns where to recruit, how to recruit, the timing and inducement that is necessary to be able to attract prospective applicants. Given below, are the means of reaching prospective applicants:

a. Unsolicited Applications from the public.

b. Referrals from people, particularly existing employees.

c. Advertisements in the mass media.

d. Educational Institutions, for more technical jobs.

e. Consultants/Employment Agencies.

f. Executive Search/Man Hunt, for some key positions.

Qualified people may not respond to adverts, so you search for them. People may not respond to adverts for the following reasons:

a. If they apply, they are not sure they will be taken.

b. The applicant may not be interested in the job/organisation.

c. The time limit given for applicants to respond to adverts may be too short and as such applicants may fear that their applications may not get to their destination on time.

Each method of reaching prospective applicants has potentials in recruiting qualified candidates. Each has cost; each has effectiveness in reaching the appropriate audience. Therefore, each can be evaluated based on these two criteria (cost and effectiveness). It is also possible to use yield ratio in evaluating the source utilized. Organisations want to create a pool, but not an excessive or inadequate pool. The yield ratio is defined as the ratio of those deemed to be qualified to the total pool. For instance, if the total pool is 1000 and those deemed to be qualified are only 50, then the yield ratio would be 1:20. If on the other hand, we have 500 out of 1000, the yield ratio will be 1:2, which is better because you can get what you want from a limited number of people.

[Milkovich and Boudrou, 1990] also presents a framework for personnel procurement, which is modelled in Figure 3.5.

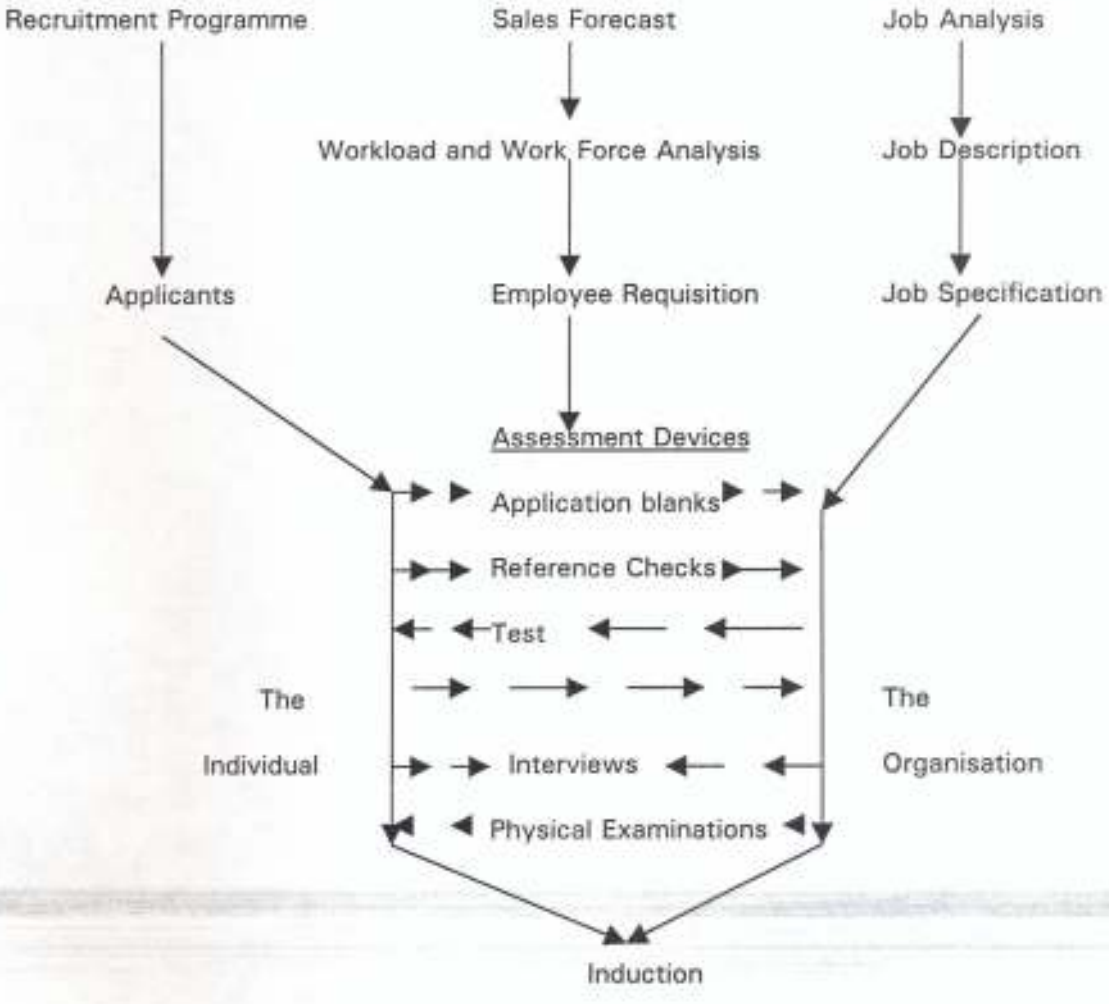


Figure 3.5 – Framework for Procurement

In order to initiate the hiring process, three preliminary requirements must be satisfied. First is the authority to hire, which comes from employee requisition, developed through analysis of work load and work force. The second is the existence of job specification, which is used as a company standard for

prospective employees. Finally, there must be job applicants from whom to select the person to be hired.

The hiring process is a series of method of obtaining relevant information about the applicant and his suitability for the job. To determine his suitability, facts about him are compared with the requirements of the job specification. If an applicant qualifies at one step, he advances to the next step in the hiring process.

In the hiring process, different methods can be adopted to discover significant information about the applicant, which can then be compared with the job specification. The following instruments can be used for obtaining information about the applicants:

a. Application blanks
b. Reference Checks
c. Tests
d. Interviews
e. Physical examination

Application blanks are means of obtaining factual information about the applicants. Empty forms are prepared and given to applicants so as to obtain personal details about the applicant. Application blanks are not enough means of obtaining information.

The essence of reference checks is to obtain information about the past

behaviour of applicants. It also helps in verifying information given on the application blank. The reference check could involve checking the applicants' work reference, verifying their educational background, checking personal references, and so on. The most common method of checking is a combination of letters and telephone calls.

After conducting reference checks, tests could be conducted. Most of the larger firms use some form of employment testing. The tests could be psychological or cognitive tests aimed at testing the psychological and mental preparedness of the applicant for the job.

Interview is most widely used single method of selection, especially in small organisations. Because of the level of subjectivity in interviews, the level of reliability is not very high. Interviews could be 'guided' or 'unguided'.

3.3 LIMITATIONS OF THE MANUAL EMPLOYMENT METHOD

The manual method of employment discussed above has the following shortcomings:

a. The advertisements do not get across to every potential applicant due to the fact that the medium chosen for the advertisement may not be such that is accessible to potential applicants. The result of this is that limited number of applicants that are suitable for the jobs apply.

b. It is a general impression that the advertisements are expensive and in most cases, are only a formality, as the job positions are filled by relatives of top managers, even before the advertisements are out.

c. Job descriptions and specifications are not always well defined in such

advertisements, to the effect that potential applicants are misinformed about the requirements and duties associated with the jobs.

d. Applicants spend a lot of money producing many copies of application letters and resumes in response to the advertisement. Because of the poor performance of the postal system in Nigeria, many applications get lost in transit. Even when the selection process is carried out, some applicants who are found appointable get their letters late. The time lag between employment and notification could be so much, to the effect that qualified and appointable candidates may have found other jobs before notification letters get to them.

CHAPTER FOUR

THE SYSTEM DESIGN

In this chapter, the architecture of the Knowledge Based System for Matching of Applicants to Jobs (KBSMAJ) is presented. The framework, adopted from [Akinyokun and Arekete ,1996] is presented in Figure 4.1. It has four basic components. Sections 4.1, 4.2, 4.3 and 4.4, respectively, discuss the four components, namely:

a. Knowledge Base

b. Inference Engine

c. Decision Support System (DSS)

d. User Interface

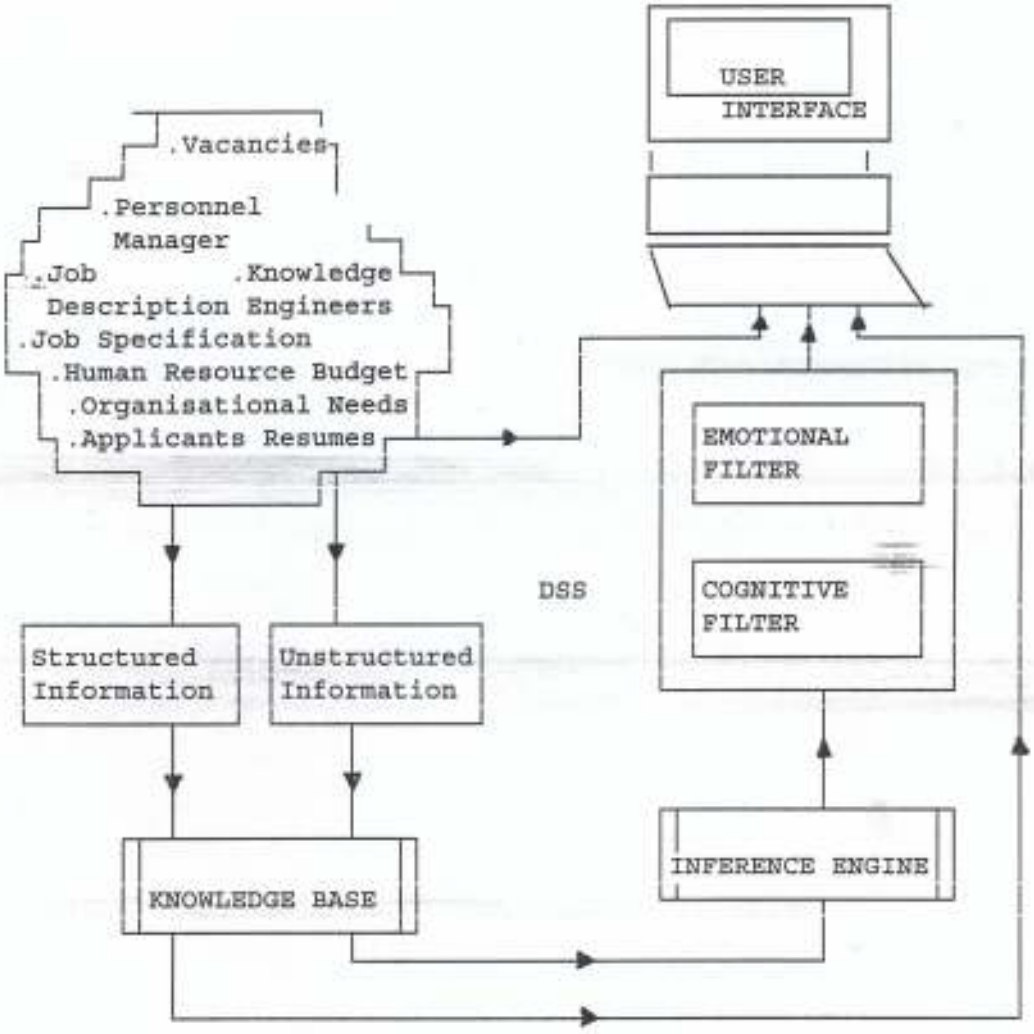


Figure 4.1 - Architecture of KBSMAJ

4.1 THE KNOWLEDGE BASE

The knowledge base consists of both structured and unstructured information from the problem domain (universe of discourse). The knowledge base serves as the information store for the operational data that are to be processed. It contains information about the prospective job applicants and the job requirements as are sent by the establishments employing the services of the job matching bureau. The Knowledge Base component of KBSMAJ contains two inter-related databases, namely: Job Requirement Database and Personal Database.

The entire knowledge base can be conceptualized as a network of relations. A relation is a two dimensional table that has a number of rows and columns. It is synonymous with the 'file' concept in the conventional data processing environment.

The properties of a relation are as follows:

a. Each relation must be single valued; that is, no repeating groups.

b. The entries in any column (attribute) must be of same type.

c. Each attribute must have a unique name.

d. Each row (tuple) must be unique, that is, no two tuples are identical.

e. The order of an attribute or tuple is not important.

The general form of a relation is given by

$R [a_1, a_2, \underline{a_3}, \ldots, a_k, a_{k+1}, \ldots, a_n]$

Where R represents the name of the relation,

a_n represents attribute n and

the underscored attributes constitute the unique key.

KBSMAJ has eight relations in its knowledge base. The first seven relations contain structured information, while the last relation, PROFICIENCY file, contains unstructured information modelled in a relation using indicators of proficiency. The relations are:

a. PERSONAL - DATA [Applicant-No, surname, other-Names, Birth-Date, Sex, Nationality, State-of-Origin, Marital-Status].

b. APPLICANTS'-REGISTRATION-DATA [Applicant-No, Application-Date, Job-Code, Organisation-of-Interest].

c. ACADEMIC-QUALIFICATION [Applicant-No, Date-of-Award, Certificate, Place-of-Award, Major-Subject, Minor-Subject, Class-of-Award].

d. PROFESSIONAL-QUALIFICATION [Applicant-No, Date-of-Award, Status, Awarding-Body].

e. JOB-HISTORY [Applicant-No, Date-Employed, Date-Disengaged, Job-Code, Status, Employer, Last-Salary, Condition-for-leaving].

f. JOB-REQUIREMENTS [Organisation-No, Job-Code, Job-Title, Vacancies, Academic-Qual-Required, Professional-Qual-Required, Experience-Required, Minimum-Age, Maximum-Age, Relevant-Position, tools-used, salary, benefits].

g. ORGANISATION [Organisation-No, Name, Address, Telephone-No, Line-of-Trade].

h. PROFICIENCY [Applicant-No, Job-No, Aptitude test, Physical-test, Intelligence-Test, Average-Score].

4.2 THE INFERENCE ENGINE

This is the module that does the actual search for and matching of applicants to jobs. It matches personal information/qualification against the job requirements. KBSMAJ adopts backward chaining method of making inferences. It takes a look at a particular job's requirements, then looks for the set of applicants that meet those requirements. It goes further to rank the applicants that meet the job requirements with a view to determining the applicants with the highest ranks for the job.

KBSMAJ is a production rule based system that is built around the following components:

a. A consultation system.

b. An explanation system.

c. A rule acquisition system.

4.2.1 Consultation System

The consultation system consists of a rule base, static and dynamic data structures and a control structure. It is coded in the IF - THEN and related clauses of PARADOX Relational Database Management System (PRDBMS). Examples of production rules employed by the consultation system are given below:

a. If the job requirement includes second class (upper) in Computer Science and age limit is 30 years, THEN disqualify candidates with second class (lower) or whose age is above 30 years.

b. If number of vacancies that exist for the job is n, THEN shortlist candidates whose ranks fall within the (2n)th position.

4.2.2 Explanation System

This system explains the rationale behind the matching process, that is, it gives the reason(s) for shortlisting candidates. This is based mostly on ranking which in turn depends on job requirements as specified by the organisation.

4.2.3 Rule acquisition System

The rule acquisition system of KBSMAJ is based on system growth and experience. It is invoked when the user selects the rule acquisition option from the main menu. It specifies some system rules regarding job matching parameters based on previous experience.

The matching of the parameters as shown in the main module is presented in figure 4.2.

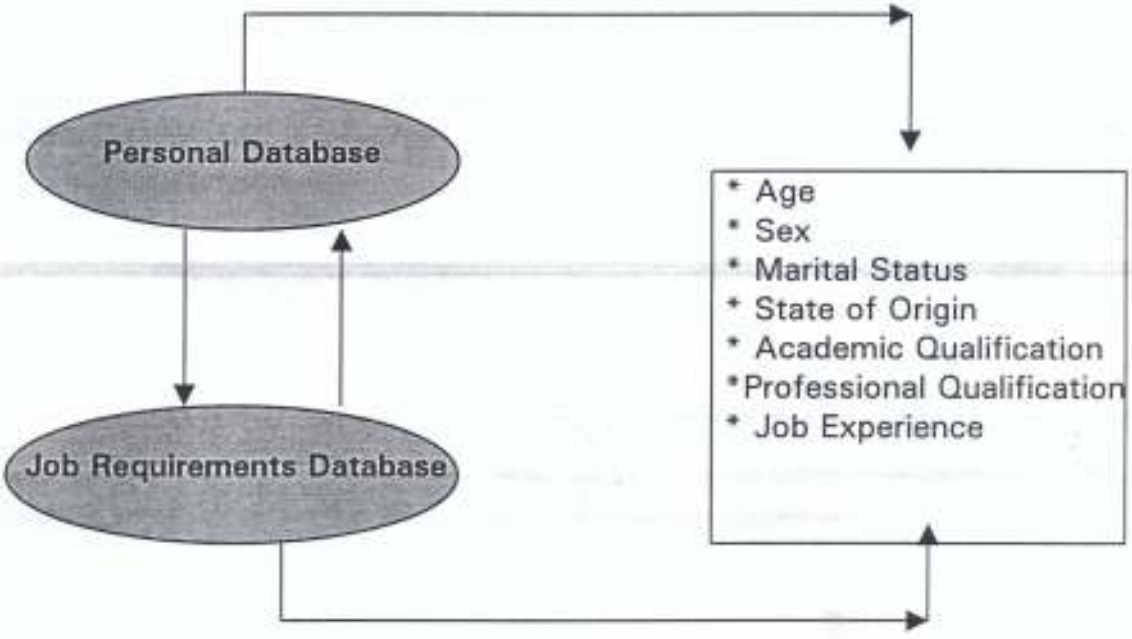


Figure 4.2 - KBSMAJ's Databases.

The Personal database has the following files:

a. Personal Data File

b. Academic Qualification File

c. Professional Qualification File

d. Job History File

e. Proficiency File

The Job Requirement database contains the following files:

a. Job Requirements file

b. Applicants Registration File

c. Organisations File

The job requirements, as contained in the Job Database are indicated by the match parameters which are eventually matched with the values in the Personal Database.

The matching exercise is a complex one because of the large number of decision variables such as age, sex, marital status, academic qualifications, professional qualifications and job experience. It involves puzzling (jig-saw) problem or combinatorial problem where the computational time could be very explosive when the decision variables are large. What is done in this work is to carefully analyse the decision variables and group them, such that a successful matching of a group will lead to the next group with a view of establishing the completeness of the matching programme.

There are submodules which match specific decision variables in the Personal Database with corresponding variables in the Job Database. These submodules

are related to one another in a hierarchical form.

a. Submodule 1 matches age, sex, marital status, state of origin

b. Submodule 2 matches academic qualification, class subjects and date of award

c. Submodule 3 matches professional qualification (awarding body, status and date of award)

d. Submodule 4 matches relevant years of experience, current responsibilities, relevant projects and tools used.

e. Submodule 5 takes in scores from tests (Aptitude, intelligence and physical), matches the scores with any restriction on those proficiency parameters, either imposed by the organisation or by the package.

The diagrammatic representations of the submodules are presented in figure 4.3 through figure 4.7.

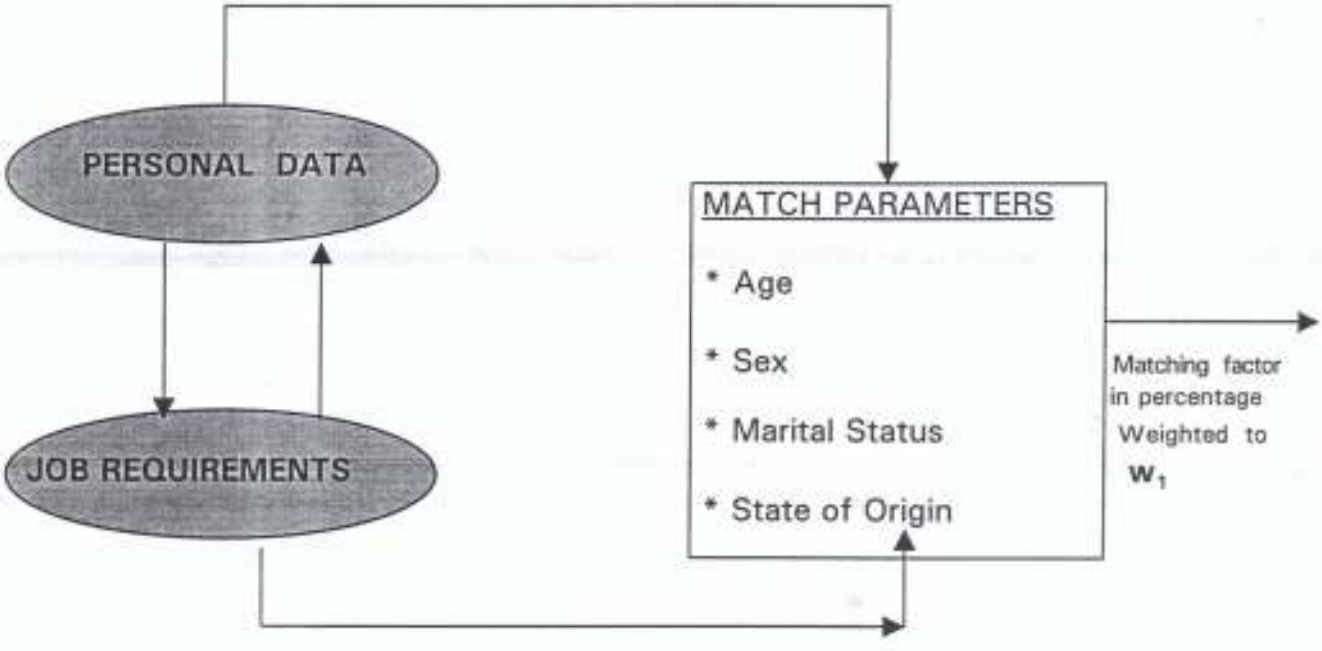


Figure 4.3 – Submodule 1, Matching Personal data with job requirements

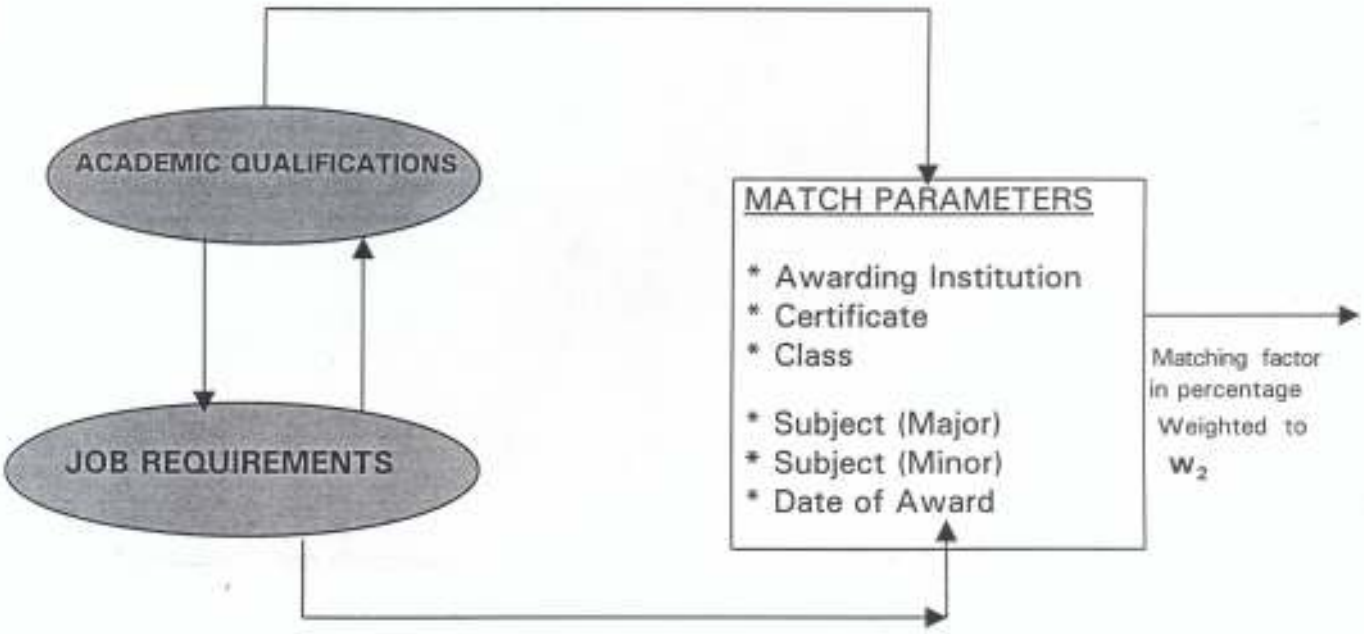


Figure 4.4 – Submodule 2, Matching academic qualifications with job requirements

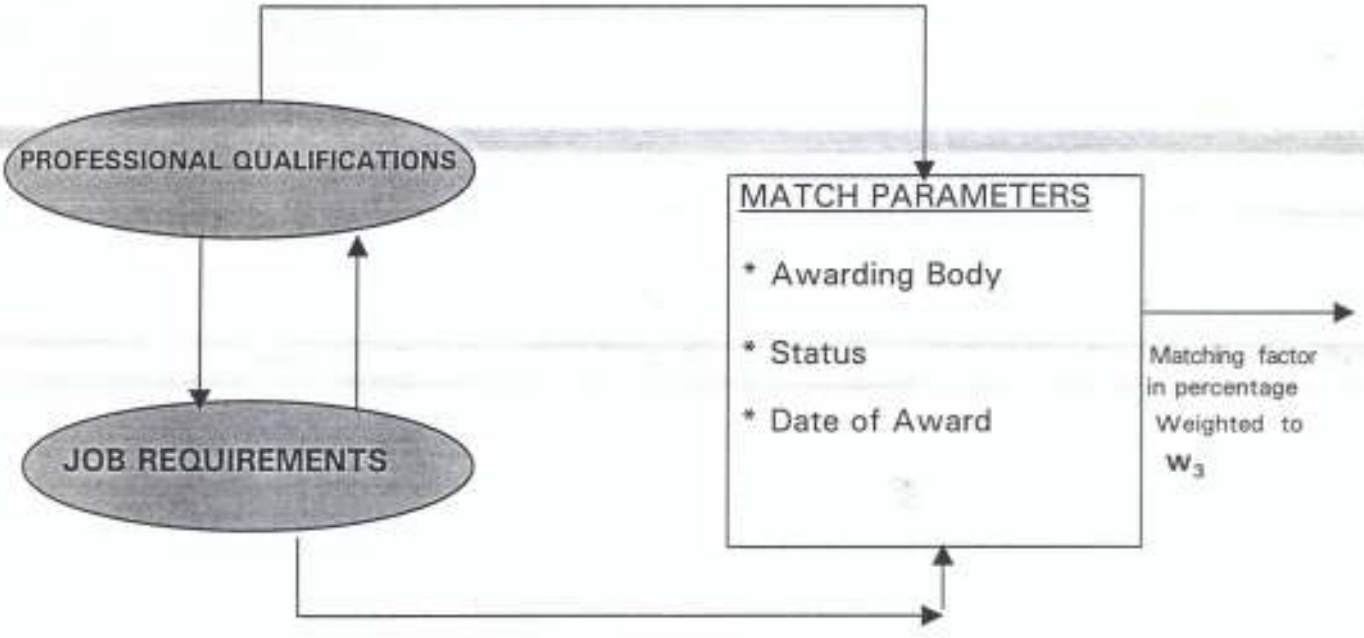


Figure 4.5 – Submodule 3, Matching professional qualifications with job requirements

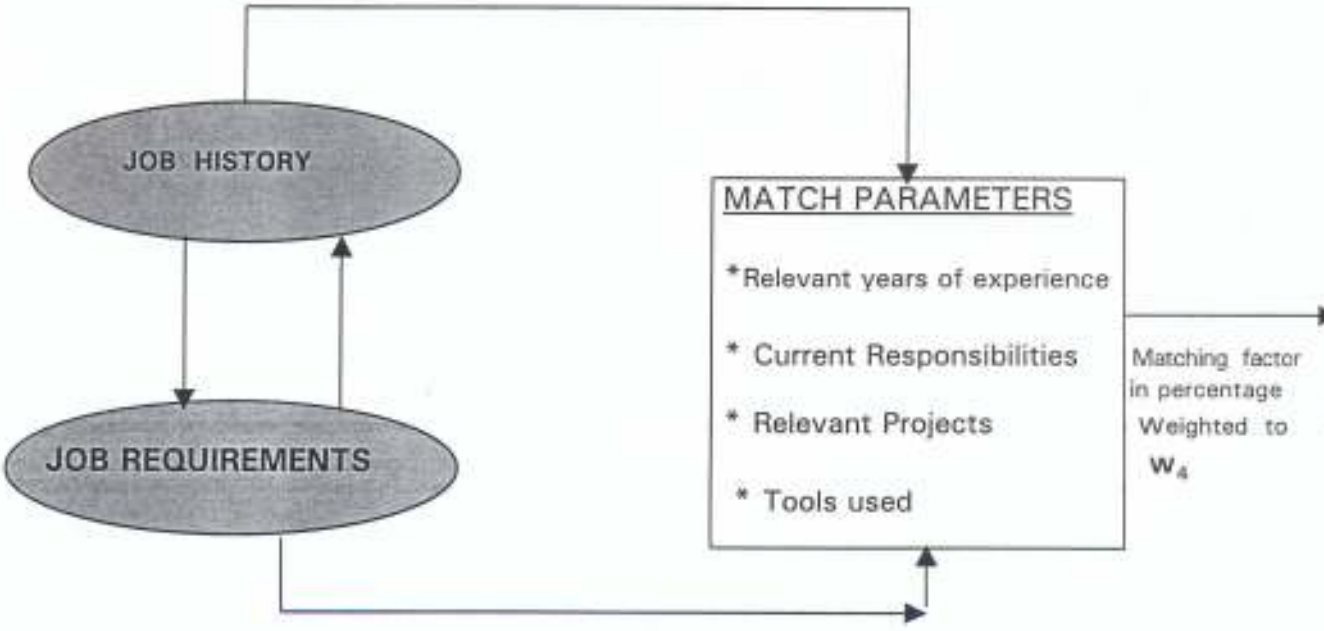


Figure 4.6 – Submodule 4, Matching job history with job requirements

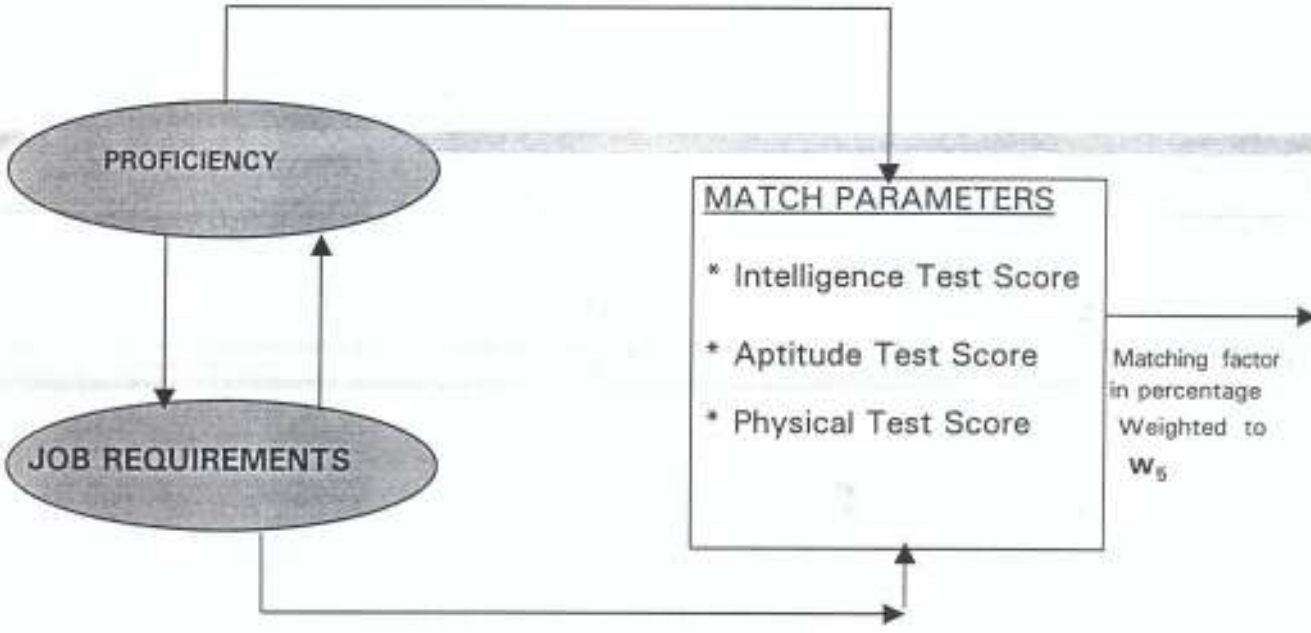
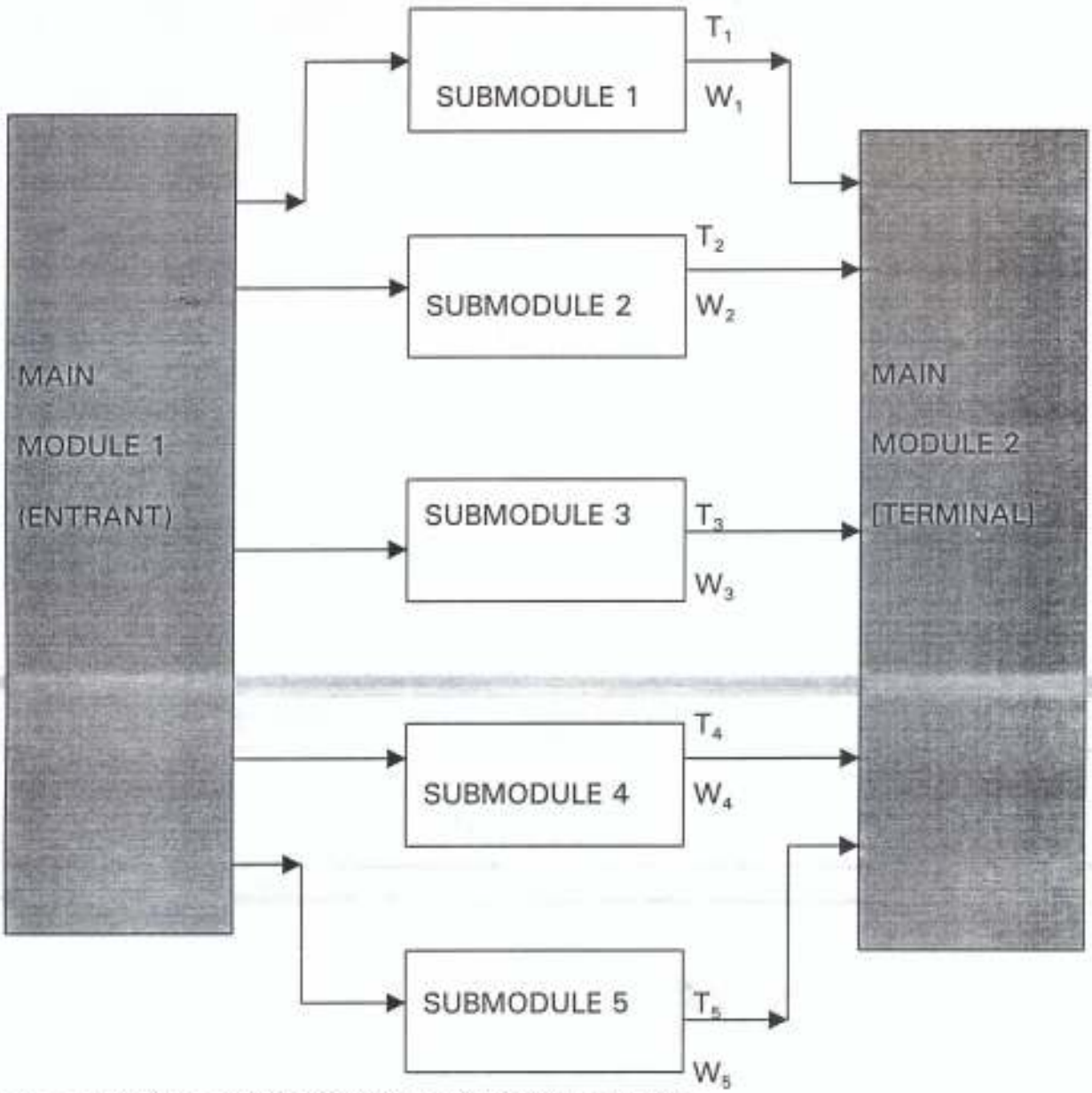


Figure 4.7 – Submodule 5, Matching proficiency with job requirements

KBSMAJ has a matching procedure that starts from the main module 1 (entrant), goes through the submodules and passes the matching factor weights to the terminal module (main module 2). The terminal module produces the list of applicants to be invited for selection interview. The diagrammatic representation is given in figure 4.8.



T_i : i = 1,2,3,4,5 represent matching Factors of ith. submodule
W_k : k = 1,2,3,4,5 represent weights attached to the matching factor of the kth submodule

Figure 4.8 - KBSMAJ Modular Relationships

Such a relationship could work more effectively in a parallel processing environment where the main module is handled by a main processor while the minor processors transfer their results to another major processor that would collate the results of the processing by the minor processors. In such a situation, the output of one minor processor must not be used as input to another minor processor.

The result of each sub-module is converted to weighted factors as follows:

Submodule	Weight
1	0.0482
2	0.3133
3	0.0361
4	0.2410
5	0.3614
	1.0000
	= = = =

The schedule of weighting of decision, variables that results in the table above is given in Appendix A.

From figure 4.8 we can deduce the following:

$$0 \le S_{ij} \le W_i \text{.....(1)}$$

where S_{ij} is the weighted score of the jth parameter of submodule i and j = 1,2,3,... p

Therefore,

$$\sum_{i=1}^{n} \sum_{j=1}^{p} S_{ij} = \sum_{k=1}^{n} W_k \le 1 \text{.....(2)}$$

The Personal Database, denoted by DB (P) is defined by:

$$DB(p) = \{F_1, F_2, ..., F_n\} \text{.....(3)}$$

where F_k : k = 1,2,...,n represents a file in DB(P).

Also, the Job Database, denoted by DB(J) is defined by

$$DB(J) = \{G_1, G_2, ..., G_m\} \text{.....(4)}$$

where G_i : i = 1,2,..., m represents a file in DB(J).

In the Personal Database, the files are defined by

$$F_i = \{d_{i,1}; d_{i,2}; \ldots; d_{i,k}\} \quad \ldots\ldots(5)$$

where F_i is the ith file and $d_{i,1}, \ldots, d_{i,k}$ define the data items in the file.

For the Job Database, the files are defined by

$$G_k = \{e_{k,1}; e_{k,2}; \ldots; e_{k,l}\} \quad \ldots\ldots(6)$$

where G_k is the kth file and $e_{k,2}, \ldots, e_{k,l}$ define the data items in the file.

The function M, which maps F_i into G_k is defined by:

$$M(F) \rightarrow G_k \quad \ldots\ldots(7)$$

That is,

$$M(\{d_{i,1}; d_{i,2}; \ldots; d_{i,k}\}) \rightarrow \{e_{k,1}; e_{k,2}; \ldots; e_{k,l}\} \quad \ldots\ldots(8)$$

The algorithms for main module 1, submodules and main module 2 are given as follows:

```
MAINPROG 1
loop m from 1 to k
match d_ik with g_kl (do procedure match 1)
endloop
do mainprog 2
return

PROCEDURE MATCH 1
loop p from 1 to s
cf=0 (cf = cummulative factor)
if match parameter d_ik = match parameter g_kl
then increment cummulative factor by 1
endloop
let t represent total expected weight
pf = cf/t * 100 (pf = percentage factor)
```

```
read W_p (W_p = weights attached to matching factor of submodule P)
wf = pf * W_p (wf = weighting factor for each module)
endloop
return

MAINPROG 2
let tcwf represent total cummulative weighting factor
tcwf = 0
loop m from 1 to n
read wf
tcwf = tcwf + wf
endloop
let numshortlist represent number to be shortlisted
numshortlist = vacancy * 2
sort tcwf
if index(tcwf) < = numshortlist
then shortlist applicant
endif
return
```

4.3 THE DECISION SUPPORT SYSTEM

The inference engine assists in matching relevant logical and functional data and reports alternative applicants that could be appointed. The Decision Support System (DSS) component of the expert system takes into consideration, some relevant knowledge of specific applicants, based on experience, in the bid of the Human Resources expert to choose the best applicants. It is the component of the system that is not only affected by the software, but also by the 'feelings' and 'knowledge' of the person(s) doing the final selection of applicants.

The DSS consists of two sub-systems, namely: cognitive filter and emotional filter.

a. The Cognitive filter, carries out inductive and deductive reasoning on the

information content of the knowledge base.

The following could constitute decisions based on cognitive information:

i. The decision on whether, say, ICAN on AIB qualification is more suitable for a job, based on the HR manager's judgement on the course syllabi of the respective qualification.

ii. The decision to employ mostly, people of a particular age bracket based on the nature of the job.

iii. The decision to employ a staff who currently works in a similar company, and in the required position.

iv. A company may have a bus service for its staff. Based on this, members of staff may be clustered within a particular location to make the bus system effective. Among the new applicants, who are found appointable, there are some who live in the same neighbourhood as the members of staff. Such an applicant may be employed instead of an applicant who lives far away from the neighbourhood because of the inconveniences associated with transportation.

v. The decision to employ somebody who had a second class (lower division) in place of somebody who had first class because of the former's past experience on the job, despite the fact that both of them had the same aggregate score.

b. The Emotional filter, carries out inductive and deductive reasoning on the information context of the knowledge base.

Given below, are examples of decisions based on emotional information:

i. In Nigeria, for example, a bread winner of a family shoulders a lot of responsibilities. Some jobs are given to relations of senior members of staff of a company who are bread winners, to assist in alleviating their financial responsibilities.

ii. The decision to employ somebody because of his state (or tribe) of origin, based on the feeling of the HR manager, that applicants from that state (or tribe) have drive and determination.

iii. The decision to drop a candidate because he was dismissed from his former place of work, even when he makes a good aggregate score in the matching process.

iv. A job may not have sex restriction, but because of the stress involved in the job, the HR manager may feel that a male would do the job better than a female; as such, employs a male, rather than a female, even when they have the same ratings.

v. An applicant may have indicated that he is a sports man. If the company in question has a sports club, the tendency is there that the applicant may be employed based on the feeling that he would represent the company in sporting activities.

vi. From the medical records of an applicant, and his or her physical appearance, he or she may be found disabled in a way. But his/her intelligent quotient may be very high. Such an applicant may be employed and deployed to an office where his/her physical contact with clients or customers could be very remote.

4.4 THE USER INTERFACE

KBSMAJ supports a user interface based on the menu-driven facility of PARADOX

Application Language (PAL). A top-down design is supported and access is gained by supplying user name and password, both of which aid the control of access.

Each menu calls on a sub-menu (as selected) which calls on inference procedure associated with that sub-menu. the inference procedure is interactive and is either menu-driven or guides the personnel bureau consultant intelligently to supply appropriate information. Alternative matching decisions will be presented to the expert and the reasoning behind the decisions also presented. The expert will have the final choice of applicants to match and recommend to the human resources department of the consulting organisation.

CHAPTER FIVE

SYSTEMS IMPLEMENTATION AND CASE STUDY

KBSMAJ is a package written in Paradox3 Relational Database Management System, following the design structure specified in the previous Chapter. In this Chapter, the case study of KBSMAJ is presented. In Appendix B, the table structure, form view and records of the following files are presented:

a. Applicants' Personal Data

b. Applicants' Registration Data

c. Applicants' Academic Qualifications

d. Applicants' Professional Qualifications

e. Applicants' Job History

f. Organisations Data

g. Job Requirements

h. Applicants' Proficiency

The records presented form the input data in the case study, which is being presented in this chapter. It is noted that the records were hypothetical in nature.

5.1 THE KBSMAJ MENU SYSTEM

KBSMAJ has a user interface that consists of the login system, the main menu and a number of submenus.

5.1.1 The Login System

Access is gained into KBSMAJ by typing KBSMAJ at the c> prompt. A banner and

a login menu are displayed on the screen. The transcript of the login menu is presented in figure 5.1. The system allows the user three trials in the login procedure, after which it terminates the access process. When the login is correct, the main menu comes up.

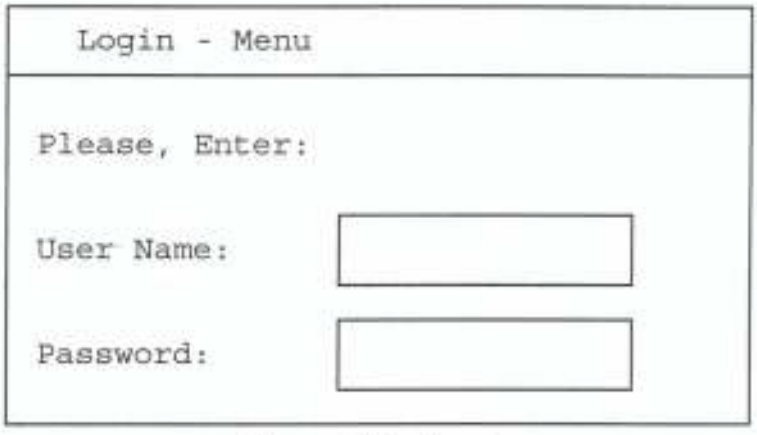


Figure 5.1 - Login menu

5.1.2 The Main Menu

The main menu, which is a bar menu, is depicted in figure 5.2. The user either uses the arrow keys or presses the first letter of an option to have access to the desired sub-menu. Directly below the menu bar, is the description of the functions carried out within the highlighted menu.

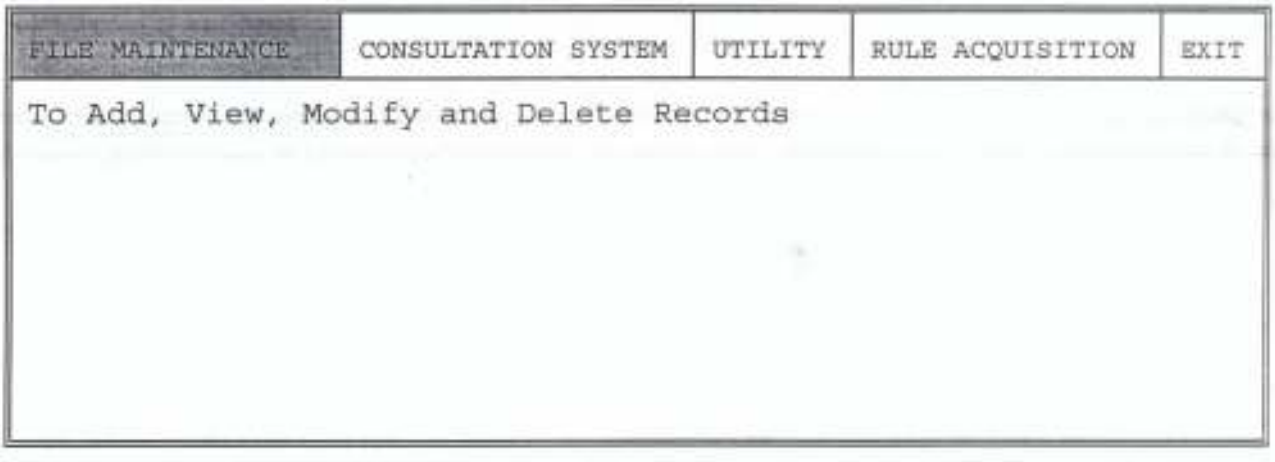


Figure 5.2 - Main Menu Screen

5.1.2.1 File Maintenance

The File Maintenance submenu allows the user to carry out the following file maintenance activities on the database files:

a. Addition of Records

b. Viewing of Records

c. Modification of Records

d. Deleting of Records

Each of the file maintenance activities has an option on the menu bar. On the selection of any of the options, the file sub-menu, depicted in figure 5.3 is displayed on the screen. At the selection of any file from the file submenu, the form (screen) view of the file is displayed on the screen. A typical form (screen) view is shown in figure 5.4. On completion of the file maintenance operation, the user presses F2 to save the operation or Esc to cancel the operation. The user is given the opportunity to access another record or press "X" + "←|" to exit that menu.

```
FILE SUBMENU

1.  Personal data
2.  Registration data
3.  Academic Qualifications
4.  Professional Qualifications
5.  Job History
6.  Job Requirements
7.  Applicant's Proficiency
8.  Exit
Please, enter an option.
```

Figure 5.3 - File Sub-menu.

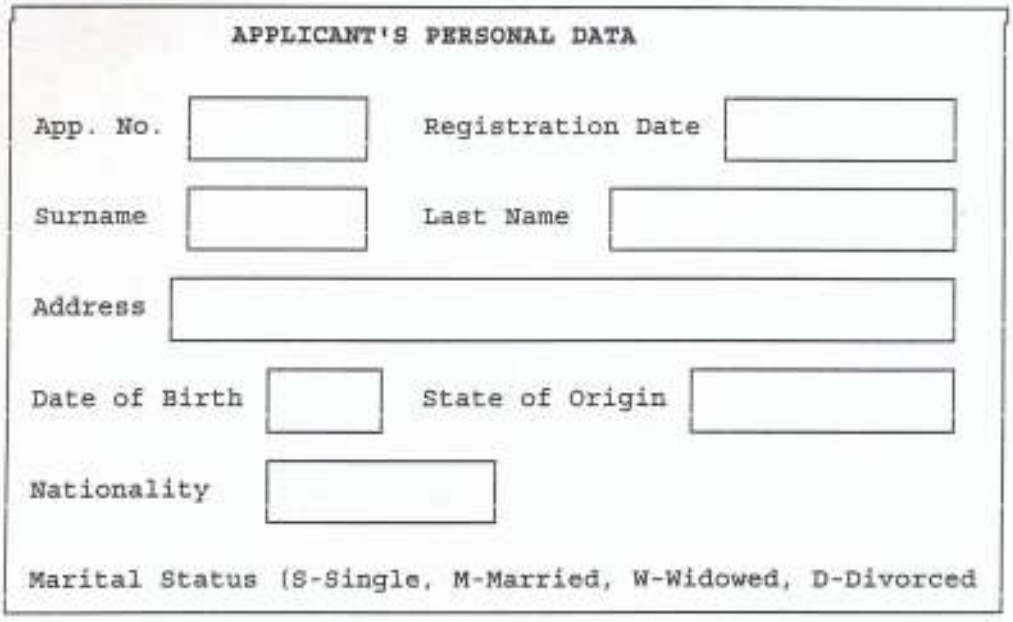


Figure 5.4 - Personal Data Form

5.1.2.2 Consultation System

This menu does the actual matching of applicants to jobs. It has the following submenus as indicated on the menu bar.

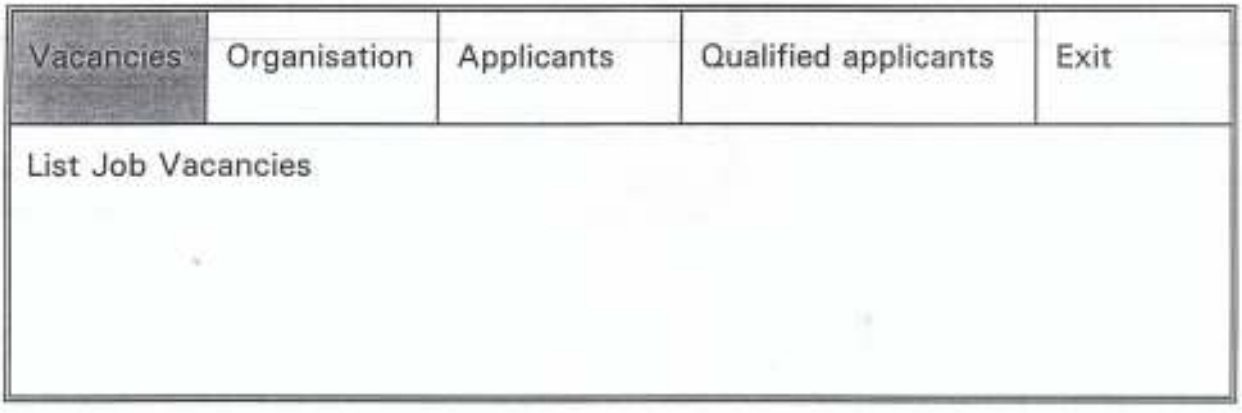


Figure 5.4 - Consultation System menu screen.

5.2.2.1 Vacancies

This option lists the vacancies that exist for the various jobs in the organisation and the qualifications required for such jobs. Periodically, this can be published to aid job redistribution. The system allows the user to send the report to any of the media options below:

a. Screen.

b. Printer

c. File

If the screen option is chosen, the report is printed on the screen and pressing "Alt-F" + "X" will take the user back to the report media menu. The same thing holds for the file option. If the printer is selected, then the user must make sure that the printer is on. The transcript of a typical output report is as follows:

KNOWLEDGE BASED SYSTEM FOR MATCHING OF APPLICANTS TO JOBS (KBSMAJ)

LIST OF AVAILABLE JOB VACANCIES

DATE REPORT WAS GENERATED: 3.02.98

S/N	NAME OF ORGANISATION	JOB DESCRIPTION	VACANCY	ACAD QUAL	MINIMUM CLASS OF DEGREE	MINIMUM REL - YEARS OF EXPERIENCE
1.	First Bank Plc, Surulere, Lagos	Computer Manager	2	B.Sc.	Second Lower	2
2.	Laas Shipping Line, Lagos	Secretary	3	OND	Second Lower	1
3.	Oluwa Glass Industry, Ondo State	Pharmacist	1	B.Sc.	Second Lower	3
4.	Aggregate Group of Companies, Benin-City	Consultant	2	MBA		3
5.	Nath. Agric. Land Dev. Authority, Akure	Soil Scientists	4	HND	Upper Credit	2
6.	Ebun Industries LTD, Ibadan	Civil Engineer	1	BENG	Second Upper	1
7.	ED & F Man. LTD, Akure	Manager	1	B.Sc.	Second Upper	5
8.	Food Specialties (Nestle), Lagos	Trainers	2	B.ED	Second Upper	3
9.	Trade World Finance LTD, Port Harcourt	Accountants	3	B.Sc.	Second Lower	2

10.	University Press LTD, Ibadan	Binders	4	OND	Lower Credit	3
11.	University Press LTD, Ibadan	Account Clerks	2	OND	Lower Credit	1
12.	F.A.O. Oseketa and Co., Umuahia	Auditors	4	B.Sc.	Lower Credit	3
13.	Modraji Holdings Company, Lagos	Sales Manager	1	MBA	--	5
14.	Churchgate Nig. Ltd, Jos	Designers	3	HND	Lower Credit	2
15.	Shell Petroleum Devt. Co., Port Harcourt	Elect. Engineers	3	B.Sc.	Second Upper	3
16.	Shell Petroleum Dev. Co., Port Harcourt	Mech. Engineers	2	BTE CH	Second Upper	2
17.	Kragha and Associates, Warri	Computer Manager	1	B.Sc.	Second Upper	5
18.	West African Examination Council, Lagos	Elec. Engineers	2	BTECH	Second Upper	3
19.	Gabret Animal Clinic, Jos	Acct. Clerks	3	OND	Lower Credit	2
20.	United Bank for Africa, Lagos	Pharmacist	1	BPHARM	--	2
21.	Fadex Technical Services, Oguta	Technologists	2	HND	Lower Credit	3
22.	The Punch, Ikeja	Cartoonists	2	HND	Lower Credit	1
23.	Benin Owena River Basin, Benin-City	Mech. Engineers	3	BENG	Second Upper	3
24.	Awosika College, Ondo	Senior Lecturer	2	PHD	--	10
25.	Rich Rotoye Group, Akure	Auditors	2	B.Sc.	Second Upper	5
26.	Nigerian Airways, Abuja	Elect. Engineers	3	BENG	Second Upper	3
27.	Blue Lakes Nig. LTD, Lagos	Crop Scientists	2	B.Sc.	Second Lower	2

5.1.2.2.2 Organisation

The organisation submenu lists the various organisations that have sent in their requisitions to the bureau. It presents basic information about the organisation, which includes the name, address, telephone number and line of trade. The transcript of a

typical output report is presented below:

KNOWLEDGE BASED SYSTEM FOR MATCHING OF APPLICANTS TO JOBS (KBSMAJ)
LIST OF ORGANISATIONS
DATE REPORT WAS GENERATED: 3.02.98

S/N	Name of Organisation	Address	Tel.	Line of Business
1.	First Bank Plc	23, Lawani Road, Surulere, Lagos	01-2456789	Banking
2.	Laas Shipping Line	56, Akobi Crescent, Off Idoro, Lagos	01-4521954	Shipping
3.	Oluwa Glass Industry	Oluwa Road, Igbokoda, Ondo State	09-5647453	Marketing
4.	Aggregate Group of Companies	67, Uselu Road, Benin-City	052-245490	Management
5.	Nath. Agric. Land Dev. Authority	Alagbaka Quarters, Akure, Ondo State	034-232567	Agriculture
6.	Ebun Industries Limited	1, Old Ife Road, Ibadan, Oyo State	02-237890	Manufacturing
7.	ED & F Man. Ltd., Akure	23, Femi Alewi Street, Akure, Ondo State	034-242611	Exportation
8.	Food Specialties (Nestle)	46, Industrial Estate, Ilupeju, Lagos	01-4545981	Manufacturing
9.	Trade-World Finance Limited	34, Rumola Street, Port Harcourt, Rivers	084-568019	Financing
10.	University Press Limited	University of Ibadan, Oyo State	022-234111	Publishing
11.	F.A.O. Osekita & Co.	62, Abriba Street, Umuahia, Abia State	088-220159	Auditing
12.	Modraji Holdings Company	Plot 34, GRA, Ikeja, Lagos	01-2616287	Trading
13.	Churchgate Nig. Limited	56, Yakubu Gowon Way, Jos, Plateau State	073-611555	Manufacturing
14.	Shell Petroleum Dev. Co.	14, Old Aba Road, Rumasi, Port Harcourt, Rivers	084-289006	Exploration
15.	Kragha and Associates	56, Airport Road, Warri, Delta State	055-421248	Drilling
16.	West African Exam. Council	WAEC Building, Yaba, Lagos	01-2218761	Examination
17.	Gabvet Animal Clinic	20, Tafawa Balewa Road, Jos, Plateau State	073-555777	Veterinary
18.	United Bank for Africa	Broad Street, Lagos	01-2668791	Banking
19.	Fadex Technical Services Ltd.	10, Eneke Road, Oguta, Imo State	083-420578	Technical
20.	The Punch, Ikeja	25, Airport Road, Ikeja	01-87720000	Publishing
21.	Benin Owena River Basin Dev. Authority	KM. 24, Benin Warri Road, Benin-City	052-478961	Water Resources
22.	Awosika College, Ondo	P.O. Box 298, Ondo, Ondo State	034-242648	Education
23.	Rich Rotoye Group	Toyin Building, Akure, Ondo State	034-231148	Finance
24.	Nigerian Airways	Nigerian Airport, Abuja	09-9872819	Aviation
25.	Blue Lakes Nigeria LTD.	1, Olaniyi Street, Idoro, Lagos	01-830722	Marketing

5.1.2.2.3 Applicants

The Applicants Module takes information from the applicants personal data and job registration files; and prints the list of candidates with jobs required, including the organisation of interest. The list is sorted in the following order:

a. Organisation

b. Job

c. Applicant

The transcript of a typical applicants listing is shown below:

KNOWLEDGE BASED SYSTEM FOR MATCHING OF APPLICANTS TO JOBS (KBSMAJ)
LIST OF APPLICANTS
DATE REPORT WAS GENERATED: 3.02.98

S/N	APPLICANT'S NAME	JOB OF INTEREST	ORGANIZATION OF INTEREST	DATE REGISTERED
1.	Adetiloye Emmanuel	Civil Engineer	Shell Petroleum	25.02.90
2.	Okoye Okondem	Civil Engineer	Shell Petroleum	25.02.91
3.	Ajibola Omotayo Tundo	Mech.I Engineer	Shell Petroleum	28.02.90
4.	Bilikisu Bola	Mech. Engineer	Shell Petroleum	30.01.90
5.	Chukwu Okey Henry	Mech. Engineer	Shell Petroleum	30.01.91
6.	Dike Ngozi	Mech. Engineer	Shell Petroleum	22.02.92
7.	Eliot Alexander	Mech. Engineer	Shell Petroleum	15.02.90
8.	Fadipe Fashola Bola	Mech. Engineer	Shell Petroleum	7.03.90
9.	Akanu Onojeta	Vet. Doctor	Udovet Co. Ltd.	16.03.92
10.	Amuno Oboh Cynthia	Vet. Doctor	Udovet Co. Ltd.	14.09.93
11.	Jibowu Jubril	Vet. Doctor	Udovet Co. Ltd.	17.03.94
12.	Mustapha Anthony J.	Vet. Doctor	Udovet Co. Ltd.	20.02.94
13.	Inoite Imonija	Sales Agent	Zantex Nig. Ltd.	15.01.95
14.	John Paul Caliot	Sales Agent	Zantex Nig. Ltd.	14.02.94
15.	Morakinyo Adebayo	Sales Agent	Zantex Nig. Ltd.	22.04.95
16.	Okoro Ikorodudu	Sales Agent	Zantex Nig. Ltd.	16.08.95
17.	Sikiru Suleiman	Sales Agent	Zantex Nig. Ltd.	22.09.95

5.1.2.2.4 Qualified Applicants

The Qualified Applicants sub module does the actual testing of applicants for jobs. it normally requests for the organisation's code and the corresponding job code of the job for which the matching is to be done. It carefully goes through the job requirements and ranks the applicants in the descending order of marks scored. At the end of the test, it presents an aggregate weight and lists qualified applicants for the given job and organisation into a file named "qualify". From this file, a report is printed concerning the candidates that are qualified for the job. This is printed out for the Human Resources manager to decide on whom to employ or invite for interview. Given below, is a transcript of a typical job match report.

KNOWLEDGE BASED SYSTEM FOR MATCHING OF APPLICANTS TO JOBS (KBSMAJ)
LIST OF QUALIFIED CANDIDATES
NAME OF ORGANIZATION: Fadex Technical Services
ADDRESS: 45, Ijapo Road, Akure
JOB NAME: Engineers
NUMBER OF VACANCIES: 4
DATE REPORT WAS GENERATED: 3.02.98

S/N	Applicant's Names	Applicant's Address	Sex	D-Birth	Acad. Qualification	Exp.	Weighted Score
1.	Ochije Henry Ike	45, Lawani Street, Lagos	M	25.06.65	BSc.	4	0.92
2.	Mustapha Abdulahi	Fed. Univ. of Tech., Yola	M	15.09.68	BENG	3	0.88
3.	Obon Okolie Sunday	Plot 18, GRA, Ikeja, Lagos	M	22.04.60	MTECH	8	0.84
4.	Abiodun Emmanuela	Jibowu Sec. Sch., Ikeja	F	01.01.69	BSc.	5	0.81
5.	Jubril Mohammed	28, Rumola Street, Port Harcourt	M	24.08.71	BTECH	2	0.79
6.	Ajibola Grace	6, Gowon Way, Jos	F	14.06.66	MENG	3	0.78
7.	Ibiam Okey Emma	42, Nkenegbu Layout, Owerri	M	16.09.70	MSc	2	0.76
8.	Omotosho Tayo	John Bosco College, Benin-City	M	14.01.62	BTECH	4	0.75

5.1.2.3 Utility

The submenu offers some basic utilities to the user. The following options exist.

a. Backup: To enable the backing up of the contents of the current working directory.

b. Restore: To enable the user restore already backed up files.

c. Dir : To see the contents of the current working directory.

d. Sort: To sort specified tables.

e. Go to Dos : To enable the user go to Dos, perform Dos operations and return to the program by typing Exit.

f. Protection: To enable authorised users to adjust/change either the passowrd or User Name.

5.1.2.4 Rule Acquisition

The Rule Acquisition submenu enables the system to generate new rules relating to the job match process. Such rules are confirmed by the user. Examples of rules that can be acquired are given below:

a. Based on previous experience, the system may set a minimum weight for any applicant that can be employed.

b. Based on previous experience, the system may set a minimum class for any candidate to be employed into certain organisations.

5.1.2.5 Exit

Selecting Exit from the main menu takes the user out of the KBSMAJ application into the Dos prompt (C>).

CHAPTER SIX

CONCLUSION

Knowledge Based Systems assist human experts in solving problems in the given subject domain. They employ the use of experiential knowledge in arriving at decisions in problem areas where straight forward enumeration of possibilities tends to prove explosive. The knowledge engineer uses the knowledge obtained from human experts in the problem domain to build a knowledge base and draw inferences based on some rules concerning the static and dynamic data contained in the knowledge base.

In this thesis, an attempt has been made to design and build a knowledge based system in the domain of human resources management, with specific focus on the human resources procurement exercise. The main objective is to build a system that assists the Human Resources department in procuring staff without necessarily going through the rigours and problems associated with the conventional manual method of procuring staff. The applicants are also saved the rigours of pursuing endlessly, jobs which may not even exist.

KBSMAJ is implemented on an IBM compatible micro computer running on MS-DOS, versions 5.0 and 6.0. The program coding was done using the Paradox Application Language (PAL) with its powerful, user friendly and interactive features. The introduction of weighting function for the matching parameters is an exhibit of probability. Thus, the final matching is not just based on the match factors but also on degrees of certainty attached to the factors.

The design of KBSMAJ takes cognisance of the fact that the Human Resources Bureau Manager/Operator may not be an expert user of computers. To this effect,

only end-user knowledge of the computing system is required to effectively operate KBSMAJ. Most selections are made from menu choices and when users need to type in values, such values are in most cases, a single character or few key strokes. The data entry dialogue screens have been made attractive so as to reduce the boredom associated with data entry and editing.

KBSMAJ is capable of doing the following:

a. Listing job vacancies that exist in various organisations. This list is to be published periodically to aid job redistribution.

b. Listing organisations that have made requests for employment and such information that could give insight into the nature of that organisation.

c. Listing applicants according to the jobs they applied for and the organisations of their interest.

d. Matching applicants to jobs using backward chaining of matching rules, and recommending successful applicants to the Human Resources Manager for employment.

e. Providing file maintenance and utility facilities for the user.

The set of data used in the case study which was carried out were hypothetical in nature. However, the results obtained from the processing of the hypothetical data demonstratede the practical use of KBSMAJ and good enough to arouse the confidence of the Human Resources Manager.

This research has attempted to develop a knowledge based system. However, the short comings associated with the use of database programming language has made the development of the rule acquisition system implicit rather than explicit. Further

work could be done in the area of rule acquisition.

This research is able to publish periodically, job vacancies that exist in the country, but it is not able to give statistical reports on employment levels in the country. Further research could be done in the area of employment reports, which could be sent to government periodically to facilitate employment evaluation, monitoring and control.

Furthermore, KBSMAJ does not address the issue of staff remuneration. Further research could be done in the area of remuneration, such that the knowledge based system could help government know the comparative cost of maintaining employment in different industries.

Other aspects of Human Resources Management could be addressed, especially Human Resources Planning. A system could be developed, such that the financial constraints in human resources planning are taken into consideration. This will aid planning based on fund availability and need.

The cost elements in a computer system are speed and storage space. Storage technology has advanced to the extent that the cost of storage has become very cheap. It is therefore, very vital that the processing speed of any computer system, vis-a-vis an application should be kept at an optimum level. Further research could be done in the area of time costing of the processing involved in KBSMAJ. Such research could introduce better algorithms that could perform efficient processing at reduced time interval. This is essential especially when the volume of records to be processed is so large.

KBSMAJ addresses proficiency, based on aptitude, intelligence and physical tests. When a job position is sensitive, especially at managerial level, the selection becomes more psychologically imperative. Highly specialised

psychometric tests have been proposed in [Ogidan, 1997]. Such tests include the Myers Briggs test which, establishes personality types by classifying candidates as extrovert or introvert, thinking or feeling, judging or perceiving. A further elebaorate system could be developed to take such phychoanalytical dimensions into consideration in choosing the right people for the right jobs.

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APPENDIX A
WEIGHTING POINTS FOR MATCH PARAMETERS

MATCH PARAMETER	POINT	TOTAL POINT	WEIGHT
Age	1	4	0.0482
Sex	1		
State of Origin	1		
Marital Status	1		
Acad. Qualification	10	26	0.3133
Class	5		
Subject	10		
Date of Award(Acad)	1		
Award Body (Prof)	1	3	0.0361
Status	1		
Date of Award(Prof)	1		
Relevant Experience	0< =X< =5	20	0.2410
Current Responsibility	5		
Relevant Projects	5		
Tools Used	5		
Aptuitude Test	10	30	0.3614
Intelligence Test	10		
Physical Test	10		
Total	83	83	1.00

APPENDIX B.1 - APPLICANTS' PERSONAL DATA FILE

APPENDIX B.1.1 - TABLE STRUCTURE

Field Name	Field Type	Width
Applicants Number	A	7
Surname	A	15
Other Name	A	15
Address	A	45
Birth-date	D	8
Sex	A	1
Nationality	A	12
Origin-State	A	12
Main-Status	A	1

APPENDIX B.1.2 - FORM VIEW

APPLICANT'S PERSONAL DATA

APP. NO.:

SURNAME: OTHER NAME:

ADDRESS:

DATE OF BIRTH: SEX:

NATIONALITY: STATE OF ORIGIN:

MARITAL STATUS: (S-SINGLE, M-MARRIED, W-WIDOWED, D-DIVORCED

APPENDIX B.1.3 LIST OF RECORDS

App_No	Surname	Other_names	Address	Birth_Date	Sex	Nationality	Origin_State	Mari_Status
0000001	OLODIOKUTA	ERINLA	1, OKOTIEBO STREET,IDIORO,LAGOS	23.09.67	M	NIGERIAN	LAGOS	M
0000002	AKINTUNDE	AKANDE	23, OLADIPO STREET, OLAGGE, IDIORO	21.11.45	F	NIGERIAN	KWARA	W
0000003	AKINTADE	AKINTUBI	GOELOGICAL SERVICES OF ONDO STATE	4.09.62	M	NIGERIAN	BAYELSA	S
0000004	ALOA	ILESANMI	PLOT 56, ILESA ROAD, ILESA	11.01.78	F	GHANIAN	KUMASI	S
0000005	OLATUNBOSUN	OLABODE	45, IJAPO ESTATE, BENIN, EDO	22.08.45	M	NIGERIAN	ONDO	M
0000006	OLOWOFESO	OLUSOLA	IMC DEPARTMENT, FUTA, AKURE	30.08.67	M	NIGERIAN	EKITI	M
0000007	SHEIK	ALHAJI	KATSINA STATE MINISTRY OF AGRICULTURE	28.02.53	M	NIGERIAN	KATSINA	D
0000008	BIYI	DARAMOLA	DEPT OF AGRIC EXTENTION, FUTA	23.09.45	M	NIGERIAN	ANAMBRA	M
0000009	HILARY	HILAKONJI	IMC DEPT, FED UNIVERSITY OF TECH, AKURE	12.11.67	F	TOGOLESE	AFLAO	S
0000010	EROKASIMA	BOMA	UNIVERSITY OF PORTHARCOURT, RIVERS STATE	2.02.67	F	NIGERIAN	GOMBE	W
0000011	IDAHOSA	IDANRAMI	34, ILORI STREET, OLADIPO, LAGOS	12.12.65	M	NIGERIAN	DELTA	M
0000012	IGODAN	VICTOR ILAROPA	20, INSTITUTE ROAD, BENIN CITY, EDO STATE	16.10.60	M	NIGERIAN	EDO	D
0000013	ABIODUN	OGUNLEYE	PLOT 19 IJAPO ESTATE, AKURE, ONDO STATE	1.01.70	M	NIGERIAN	ONDO	S
0000014	SANDA	ALHAJI	23, GOMBE STREET, BAUCHI	23.09.56	M	NIGERIAN	KANO	M
0000015	SULEIMAN	AMINATU LARA	15, TUDUN WADA STREET, MINNA, NIGER STATE	9.09.75	F	ALGERIAN	ALGEIRS	S
0000016	ABDULKARIM	ILADIKO OLA	78, SARAKI STREET, ILORIN, KWARA STATE	21.07.56	M	NIGERIAN	KWARA	D
0000017	OKEKE	OKOLI NKOLI	23, ABAGANA STREET, AWKA, ANAMBRA STATE	18.06.45	F	NIGERIAN	EBONYE	W
0000018	BOMA	MINA BROWN	176, RUMUOLA STREET, PORT HARCOURT, RIVERS	12.01.67	M	NIGERIAN	RIVERS	S
0000019	OLADIPO	OLAYERA	34, MODAKEKE STREET, ILE-IFE, OSUN STATE	31.01.59	M	NIGERIAN	OYO	M
0000020	JIDEOBI	OLUCHI NGOZI	12, LAWANI CRESCENT, APAPA, LAGOS	16.06.76	F	NIGERIAN	IMO	S
0000021	JOJOLOLA	OLABISI AJAYI	PLOT 23, NAVY BARRACKS, LAGOS	9.07.59	M	NIGERIAN	OSUN	M
0000022	BODE	OLAJUMOKE	34, BROAD STREET, LAGOS	8.08.67	F	NIGERIAN	EKITI	M
0000023	OKON	OKONDEM AKPAN	12, LASBY STREET, CALABAR, CROSS RIVER STATE	16.02.60	M	NIGERIAN	AKWA IBOM	D
0000024	WILCOX	CYNTHIA OLI	PLOT 45 G.R.A., PORT HARCOURT, RIVERS STATE	15.11.70	F	NIGERIAN	RIVERS	S
0000025	OYOYO	NNEKA NKIRU	90, IKETONYE ROAD, ABAKILIKI	25.05.57	M	NIGERIAN	ABIA	M
0000026	BILIKISU	AJAYI OMOTUNDE	28, ONDO ROAD, AKURE, ONDO STATE	23.11.75	F	SENEGALESE	CONAKRY	D
0000027	ONYIA	CHRISTOPHER	67, AGUNZE ROAD, OGUTA, IMO STATE	30.03.54	M	NIGERIAN	ANAMBRA	M
0000028	OLAYERA	OLABODE	SHELL PETROLEUM PLC	1.01.66	M	NIGERIAN	OSUN	M
0000029	OLATUNBOSUN	KOLAMOLE ONI	IKOTUN QUARTERS, ABEOKUTA, OGUN STATE	31.01.68	M	NIGERIAN	OGUN	S
0000030	DANTATA	AMINU KOLE	12, TAGWAI DAMN ROAD, MINNA, NIGER STATE	23.02.70	M	NIGERIAN	BAUCHI	M
0000031	BALA	USMAN ALIKAMA	90, AMINU KANO WAY, KANO	21.05.69	M	NIGERIAN	NIGER	S
0000032	BIODUN	OLU TOYIN	78, GATEWAY ROAD, IJEBU ODE, OGUN STATE	7.07.50	F	NIGERIAN	LAGOS	M
0000033	OKORE	OLUCHI	57, LADIPO STREEET,KOMAE,KOGI	8.09.59	M	NIGERIAN	KOGI	M
0000034	ADEBAYO	OLUSOLA	43 ALAGBAKA STREET, AKURE, ONDO STATE	28.02.62	M	NIGERIAN	ONDO	M
0000035	ADESUNKANMI	TITILAYO	63, WHARF ROAD, APAPA, LAGOS	30.09.69	F	NIGERIAN	OSUN	S
0000036	ANIMASHAUN	BABATUNDE	76, SHITTU STREET, OJELEGBA, LAGOS	22.11.65	M	NIGERIAN	OYO	M
0000037	OCHIJE	IKECHUKWU HENRY	29, OLADUNJOYE CRESCENT, IKOTUN, LAGOS	11.08.72	M	NIGERIAN	ENUGU	S
0000038	ODUMOSU	JENNIFER JANET	1, NWAFOR STREET, EGBE, LAGOS	21.10.67	F	NIGERIAN	EDO	M
0000039	ADEBISI	ADEBAYO TAYO	43, STADIUM ROAD, AKURE, ONDO STATE	30.03.61	M	NIGERIAN	ONDO	D
0000040	ONYIA	PRISCILA	PLOT 11, ISLELE QUARTERS, ISELE UKWU, DELTA	19.07.54	F	NIGERIAN	DELTA	M
0000041	OYEBADE	ADEBAYO	15, TAJUDEEN CRESCENT, LOKOJA, KOGI STATE	28.09.75	M	NIGERIAN	KOGI	S
0000042	IMOHE	OSAHAN ANTHONY	QUARTER 19, SENIOR STAFF QTR, NIG ARMY, BENIN	22.03.60	M	NIGERIAN	EDO	M
0000043	AJUFO	EMMANUEL OKOLI	62, OKOLI LAYOUT, ACHALA, ENUGU STATE	4.04.50	M	NIGERIAN	ANAMBRA	M
0000044	OWOSENI	DARAMOLA	EKENE DILI CHUKWU MOTORS, MUSHIN, LAGOS	11.11.70	M	NIGERIAN	ONDO	S
0000045	KANO	AMINAT AISHATU	14 TUDUN WADA ROAD, KADUNA	3.03.78	F	NIGERIAN	KATSINA	D
0000046	INOITE	IMONITE ILAGBI	115, EDO STREET, OFF KPAKPAVHA, BENIN CITY	16.01.59	F	NIGERIAN	EDO	M
0000047	JAJA	MAJOR RED	16,EAST WEST ROAD, CHOBA, PORT HARCOURT	23.08.69	M	NIGERIAN	RIVERS	M
0000048	GOWAN	JOSEPH JOHN	67 YAKUBU GOWAN STREET, JOS, PLATEAU STATE	12.12.70	M	NIGERIAN	PLATEAU	S
0000049	SIKIRU	ONOJA	FLAT 13, AREA 3, ZONE 4, WUSE, ABUJA	16.06.64	M	NIGERIAN	OSUN	M
0000050	IJEZIE	CHIDI UCHEAMAKA	10, ENEKE ROAD, OGUTA, IMO STATE	14.04.70	M	NIGERIAN	IMO	S
0000051	OKORO	CHIOMA GENEVIEV	11, TAFAWA BELEWA, JOS,PLATEAU STATE	20.11.69	F	NIGERIAN	ABIA	S

0000052	RANKA	ROSELINE	12, JAKWANU STREET, SUKURU, PLATEAU	11.01.70	F	NIGERIAN	PLATEAU	S
0000053	DAVIS	MERCY INE	1, DIOBU STREET, MILE 2, P.H, RIVERS STATE.	10.10.71	F	NIGERIAN	RIVERS	M
0000054	JOHNSON	JUDE	13, REGINA COKEKAR STREET, IKEJA, LAGOS.	1.01.68	M	NIGERIAN	BAYELSA	M
0000055	ADEOYE	BOLA	2, LEO STREET, AKURE.	20.02.70	F	NIGERIAN	ONDO	S
0000056	AJIBOLA	JIDE	3, CHURCH STREET, JOS, PLATEAU STATE.	11.12.71	M	NIGERIAN	EKITI	M
0000057	KUNLE	NKEIRU	25, STADIUM JUNCTION, AKURE, ONDO STATE.	2.04.67	F	NIGERIAN	OSUN	M
0000058	KAYODE	JIBOLA	5, NEW HEAVEN, INDUSTRIAL LAYOUT, ENUGU.	6.06.70	M	NIGERIAN	OSUN	S
0000059	CHUKWURA	NGOZIKA	6, AZIKIWE ROAD, UMUAHIA, ABIA STATE.	7.07.71	F	NIGERIAN	ENUGU	M
0000060	BROWN	LUCIA	5, UZUMBA AVENUE, VICTORIA ISLAND, LAGOS.	2.03.60	F	AMERICAN	TAXAS	S
0000061	OJO	SHADO	2, LAGOS ROAD, BENIN CITY, EDO STATE.	24.10.57	M	NIGERIAN	OGUN	M
0000062	OKORO	JOHN	96,ENUGU ROAD, UMUAHIA, ABIA STATE.	11.04.64	M	NIGERIAN	ANAMBRA	S
0000063	AKPAN	PETER	66, OBOSI ROAD, CALABAR, CROSSRIVERS STATE.	15.01.71	M	NIGERIAN	CROSSRIVER	M
0000064	EFFIONG	EDEM	90, OKOROCHA AVENUE, ABA, ABIA STATE.	16.03.72	M	NIGERIAN	AKWAIBOM	S
0000065	UKPO	SALAMI	65, ROCK HEAVEN, JOS, PLATEAU STATE.	17.01.62	M	NIGERIAN	OYO	M
0000066	UYO	GRACE	7, BARIKI LADI STREET, NASARAWA,PLATEAU STATE	18.02.63	F	NIGERIAN	CROSSRIVER	M
0000067	EWEKA	ANGELA	50, IKORODU ROAD, LAGOS,LAGOS STATE.	20.05.61	F	NIGERIAN	IMO	M
0000068	KAZEEN	SHITTU	84, KADUNA STREET, OWERRI, IMO STATE.	23.07.67	M	NIGERIAN	PLATEAU	S
0000069	ADIM	KENNITH	94, JOS ROAD, ABUJA.	25.08.64	M	NIGERIAN	AKWAIBOM	M
0000070	SMITH	KETTY	67, MILLIONIAS QUARTERS, JOS, PLATEAU STATE.	12.06.72	F	NIGERIAN	BRITIAN	M
0000071	NWEKE	ADA	34, YOLA ROAD, BAUCHI, BAUCHI STATE.	6.07.65	F	NIGERIAN	ENUGU	M
0000072	PIUS	JOY	65, BAUCHI ROAD, JOS, PLATEAU STATE.	13.08.71	F	NIGERIAN	NASARAWA	S
0000073	NWAIWU	NNENNA	5, BONNY STREET, ABA, ABIA STATE.	10.03.70	F	NIGERIAN	IMO	S
0000074	ADELEKE	SOLA	6, WARRI STREET, BENIN CITY, EDO STATE.	3.11.60	M	NIGERIAN	OGUN	M
0000075	AMINU	HELEN	7, MINNA ROAD, JABA,NIGER STATE.	20.06.71	F	NIGERIAN	NIGER	S
0000076	CHUKWU	IFEANYI	20, LEO AVENUE, OWERRI,IMO STATE.	8.02.68	M	NIGERIAN	IMO	M
0000077	IFESINACHI	HOPE	5, KANO STREET, ABUJA.	11.03.70	F	NIGERIAN	ANAMBRA	S
0000078	INEH	EMMANUEL	5, SALMI STREET, SURULERE, LAGOS.	5.09.66	M	NIGERIAN	DELTA	M
0000079	ADESINA	TOLA	45, YELWANDE CLOSE, KANO, KANO STATE.	22.06.71	F	NIGERIAN	ONDO	S
0000080	ONOCHIE	JOY	556,BROAD STREET, LAGOS.	23.08.60	F	NIGERIAN	ENUGU	M
0000081	JIBOWU	SHOLA	86,BOLAJI AVENUE, ONDO, ONDO STATE.	5.05.67	F	NIGERIAN	OYO	M
0000082	UZOMA	GAB	64, IGBO STREET, ENUGU, ENUGU STATE.	9.09.65	M	NIGERIAN	ABIA	M
0000083	BROSTON	TERISTER	70 AMADU BELLO WAY, NASARAWA, NASARAWA STATE.	6.06.65	F	AMERICAN	ATLANTA	M
0000084	WHITEMAN	GENA	73, APATA STREET, JOS, PLATEAU STATE.	7.03.64	F	CANADIAN	CANANA	M
0000085	CHUKWUEMEKA	JENE	65, SCHOOL ROAD, BENIN CITY, EDO STATE.	2.02.72	F	NIGERIAN	IMO	S
0000086	IJIOMA	HELEN	70, EKET STREET, PORT HARCURT, RIVERS STATE.	4.04.57	F	NIGERIAN	ABIA	M
0000087	UCHENNA	IFEOMA	45, OBOWU STREET, UMUAHIA, ABIA STATE.	7.08.56	F	NIGERIAN	IMO	M
0000088	ADESIDA	TOLU	50, AIRWAYS, AKURE, ONDO STATE.	30.05.67	M	NIGERIAN	OGUN	M
0000089	AGWU	AMAKA	60, MOBIL AVENUE, WARRI, DELTA STATE.	4.03.72	F	NIGERIAN	ENUGU	S
0000090	ANIA	ALU	30, RHODE AVENUE, SHAGAMU, OGUN STATE.	24.06.70	M	NIGERIAN	OGUN	S
0000091	ANOZIE	GRACE	45, FINBARRS STREET, ABA, ABIA STATE.	8.03.69	F	NIGERIAN	IMO	M
0000092	ALOZIE	GLORY	55, ADINDU STREET, ONITSHA, ANAMBRA STATE.	3.03.63	F	NIGERIAN	ABIA	M
0000093	OGBANGA	IJEOMA	5, OGBANGA AVENUE, PORT HARCURT, RIVERS STATE	2.01.70	F	NIGERIAN	RIVERS	S
0000094	UZOEMENAM	IKENNA	43, AGULU STREET, OWERRI, IMO STATE.	5.05.55	M	NIGERIAN	ENUGU	M
0000095	EMENIKE	UZOMA	70, AHUDA STREET, UZOAKOLI, ABIA STATE.	6.09.56	M	NIGERIAN	ANAMBRA	M
0000096	IZUOGU	AMOGU	7, ABA ROAD, PORT HARCURT, RIVERS STATE.	4.06.58	M	NIGERIAN	ABIA	M
0000097	ABIOLA	DELE	54, OBA ADESIDA ROAD, IBADAN, OYO STATE.	9.09.72	M	NIGERIAN	OSUN	S
0000098	ABORISHADE	BIOLA	6, IKORODU ROAD, LAGOS.	16.04.71	F	NIGERIAN	OGUN	S
0000099	ADEOSUN	IDOWU	67, BANK ANTHONY WAY, LAGOS.	13.11.70	F	NIGERIAN	OYO	S
0000100	TITILAYO	LADE	88,IKOT EKPENE ROAD, UYO.	27.05.68	F	NIGERIAN	ONDO	M

APPENDIX B.2 - APPLICANTS' REGISTRATION DATA FILE

APPENDIX B.2.1 TABLE STRUCTURE

Field Name	Description	Field Type	Width
App-No	Applicant's Number	A	7*
App-Date	Date of Appliation	D	8*
Job-Code	Job Applied for	A	6
Org-Int	Organisation of Interest	A	6

APPENDIX B.2.2 - FORM VIEW

APPLICANT'S REGISTRATION DATA

APPLICANT'S NUMBER:
DATE OF APPLICATION:
JOB CODE:
ORGANISATION OF INTEREST:

APPENDIX B.2.3 - LIST OF RECORDS

APP_NO	App_Date	Job_Code	Org_int
0000001	23.08.91	000001	100001
0000002	24.07.91	000001	100001
0000003	26.11.91	000001	100001
0000004	21.09.92	000003	100002
0000005	23.09.92	000003	100003
0000006	30.03.92	000002	100002
0000007	11.06.92	000002	100002
0000008	12.01.93	000004	100002
0000009	24.10.93	000001	100001
0000010	30.03.93	000002	100001
0000011	21.02.93	000003	100002
0000012	31.01.93	000004	100011
0000013	23.08.93	000001	100010
0000014	8.08.93	000020	100001
0000015	3.04.94	000021	100005
0000016	14.01.94	000011	100004
0000017	16.01.94	000010	100021
0000018	15.02.94	000010	100022
0000019	11.03.94	000006	100003
0000020	12.03.94	000003	100007
0000021	31.03.94	000002	100001
0000022	3.03.94	000001	100001
0000023	4.04.94	000010	100005

0000024	16.04.94	000015	100011
0000025	14.04.94	000020	100017
0000026	19.04.94	000021	100010
0000027	12.05.94	000001	100001
0000028	12.05.94	000002	100009
0000029	13.05.94	000019	100002
0000030	18.05.94	000001	100018
0000031	22.05.94	000001	100001
0000032	2.01.95	000003	100018
0000033	2.01.95	000004	100004
0000034	3.01.95	000003	100006
0000035	9.01.95	000011	100009
0000036	9.01.95	000001	100001
0000037	12.02.95	000001	100018
0000038	14.02.95	000002	100004
0000039	15.02.95	000020	100002
0000040	15.02.95	000021	100017
0000041	18.02.95	000004	100010
0000042	1.03.95	000004	100001
0000043	5.03.95	000011	100002
0000044	9.04.95	000006	100008
0000045	16.04.95	000003	100010
0000046	16.04.95	000010	100005
0000047	20.04.95	000005	100002
0000048	21.04.95	000021	100021
0000049	22.04.95	000020	100009
0000050	25.04.95	000006	100016
0000051	25.04.95	000011	100014
0000052	26.04.95	000001	100015
0000053	26.04.95	000007	100011
0000054	26.04.95	000013	100012
0000055	26.04.95	000008	100009
0000056	30.04.95	000011	100003
0000057	1.05.95	000023	100008
0000058	10.05.95	000011	100011
0000059	10.05.95	000013	100012
0000060	11.05.95	000009	100023
0000061	11.05.95	000007	100001
0000062	20.05.95	000011	100009
0000063	20.05.95	000024	100004
0000064	28.05.95	000025	100003
0000065	3.06.95	000017	100006
0000066	14.06.95	000008	100011
0000067	16.06.95	000001	100023
0000068	20.06.95	000003	100006
0000069	22.06.95	000007	100003
0000070	23.06.95	000003	100001
0000071	4.07.95	000005	100009
0000072	3.08.95	000001	100012
0000073	15.08.95	000020	100023
0000074	15.08.95	000024	100022
0000075	23.08.95	000020	100019
0000076	30.08.95	000021	100017

0000077	1.09.95	000012	100011
0000078	23.09.95	000006	100009
0000079	26.09.95	000009	100003
0000080	27.09.95	000018	100002
0000081	29.09.95	000019	100016
0000082	6.10.95	000014	100021
0000083	12.10.95	000012	100025
0000084	14.10.95	000009	100016
0000085	16.10.95	000006	100010
0000086	20.10.95	000002	100004
0000087	21.11.95	000019	100005
0000088	4.01.96	000017	100008
0000089	13.01.96	000015	100011
0000090	15.01.96	000005	100014
0000091	21.06.97	000003	100008
0000092	2.07.97	000002	100001
0000093	14.08.97	000008	100020
0000094	6.11.97	000001	100008
0000095	23.11.97	000021	100004
0000096	4.12.97	000023	100005
0000097	15.01.98	000025	100016
0000098	20.01.98	000002	100019
0000099	25.01.98	000007	100003
0000100	12.02.98	000008	100011

APPENDIX B.3 - APPLICANTS' ACADEMIC QUALIFICATIONS

APPENDIX B.3.1 - TABLE STRUCTURE

Field Name	Description	Field Type	Width
App-No	Applicants Number	A	7*
Daward	Date of Award	D	8*
Qual	Qualification	A	10
Plaward	Place of Award	A	45
Majsubj	Major Subject	A	15
Minsubj	Minor Subject	A	15
Class	Class of Degree	N	1

APPENDIX B.3.2 - FORM VIEW

APPLICANTS' ACADEMIC QUALIFICATION

App. No.:

DATE OF AWARD: QUALIFICATION:

ADDRESS OF AWARDING INST.:

MAJOR SUBJECT: MINOR SUBJECT:

CLASS:

APPENDIX B.3.3 - LIST OF RECORDS

23.02.98 APPLICANTS' ACADEMIC QUALIFICATION Page 1

App_No	Daward	Qual	Plaward	Majsubj	Minsubj	Class
0000001	25.09.86	BSc	FED.UNIVERSITY OF TECH,AKURE	COMPUTER	ELECTRONICS	2
0000002	14.01.90	MBA	UNIVERSITY OF BENIN	BUS ADMIN	-	0
0000003	10.10.89	HND	THE POLYTECHNIC, IBADAN	GEOLOGY	SCIENCE TECH	3
0000004	8.05.84	OND	IBADAN POLYTECHNIC	SEC-ADMIN	-	3
0000005	6.06.88	OND	IBADAN POLYTECHNIC	SEC-ADMIN	-	3
0000006	4.12.93	HND	KWARA STATE POLYTECHNIC	SEC-ADMIN	-	3
0000007	20.11.83	HND	POLYTECHNIC OWO	ENGINEERING	SC MANAG.	2
0000008	26.08.93	NSE	NSE LAGOS CENTRE	ENGINE	SC MGT	2
0000009	17.03.94	BSc	UNIVERSITY OF IBADAN	POL SCIENCE	-	3
0000010	12.04.94	MBA	UNIVERSITY OF LAGOS	FOOD TECH	-	0
0000011	26.02.86	OND	FED. POLYTECHNIC ADO-EKITI	LAB TECH	-	3
0000012	29.05.82	B.AGRIC	UNIVERSITY OF IFE	AGRIC ECONS.	AGRIC ECONS	2
0000013	30.06.87	HND	FEDERAL POLY, ADO-EKITI	MARKETING	BUS/ADMIN	2
0000014	4.07.92	BSc.	OBAFEMI AWOLOWO UNI, ILE-IFE	SCIENCE	PHYSICS	3
0000015	22.10.86	OND	ONDO STATE POLY, OWO	T&R PLANNING	-	3
0000016	11.12.90	HND	ONDO STATE POLY, OWO	ESN	-	3
0000017	25.06.83	MBBS	UNIVERSITY OF NIGERIA, NSUKKA	MEDICINE	-	0
0000018	20.08.88	ND	THE POLYTECHNIC, IBADAN	PURCHASING	MARKETING	3
0000019	18.09.96	HND	KWARA STATE POLYTECHNIC	PERSONNEL&MGT	PURCHASING	3
0000020	20.06.86	NCE	OSUN STATE COLL. OF EDU. ILESHA	ECONS	HISTORY	3
0000021	15.06.86	BSc	UNIVERSITY OF IBADAN	PSYCHOLOGY	ECONOMICS	2
0000022	23.07.86	ND	THE POLYTECHNIC IBADAN	ACCOUNTANCY	BUS ADMIN	3
0000023	18.06.83	BSc	UNIVERSITY OF BENIN	ACCOUNTANCY	MANAGEMENT	2
0000024	15.05.84	OND	ONDO STATE POLY, OWO	ACCOUNTANCY	-	2
0000025	20.04.84	BSc	UNIVERSITY OF JOS, JOS	BIOLOGY	-	2
0000026	17.03.86	ND	ONDO STATE POLY, OWO	BUS . ADMIN.	-	2
0000027	15.06.89	HND	FEDERAL POLYTECHNIC, ADO	BUS. ADMIN.	-	2
0000028	18.05.91	PGD	FEDERAL UNVERSITY OF TECH, AKURE	COMPUTER SC.	-	2
0000029	19.10.94	MSc	COLLEGE OF TECH, YABA	EDUCATION	RELIGION	0
0000030	3.03.82	B. AGRIC	COLLEGE OF AGRIC. IMO	AGRIC ECONS	PHYLOSOPHY	4
0000031	21.04.88	HND	ANKPA COLLEGE OF EDUCATION	MATHS	PHYSICS	3
0000032	22.04.97	BSc	UNIVERSITY OF NIGERIA, NSUKKA	BIOCHEMISTRY	BIOLOGY	2
0000033	20.05.95	B. ENG	UNIVERSITY OF BENIN	ELECTRICAL	ELECTRONICS	1
0000034	30.01.87	BSc	UNIVERSITY OF LAGOS, AKOKA	PHARMARCY	CHEMISTRY	2
0000035	29.02.92	NCE	FEDERAL COLLEGE OF EDUCATION, ENUGU	LITERATURE	HISTORY	4
0000036	4.04.94	MBBS	AHMADU BELLO UNIVERSITY, ZARIA	MEDICINE	-	0
0000037	12.11.89	PHD	UNIVERSITY OF JOS	BANKING	-	0
0000038	13.07.97	PHD	UNIVERSITY OF BENIN	MASS COM.	-	0
0000039	15.07.97	MSc	UNIVERSITY OF JOS	COMPUTER SC.	-	0
0000040	3.10.85	BSc	UNILAG AKOKA, YABA	FINACE	-	2
0000041	13.03.87	NCE	C.O.E BENIN CITY	PHE	-	3
0000042	15.08.92	BAED	OBAFEMI AWOLOWO UNIV. OF ILE-IFE	PHE	-	2
0000043	14.03.84	OND	OGUN STATE UNIVERSITY	MARKETING	-	2
0000044	10.11.87	HND	FED. POLY BAUCHI	SURVEYING	-	2
0000045	15.12.93	BSc	UNIVERSITY OF BENIN	EDUCATION	PHYSICS	1
0000046	27.02.84	MA	FED. UNIVERSITY TECH. AKURE	AGRIC ECONS	-	0
0000047	6.06.89	MSc	FED. UNIVERSITY OF OWERI	HYDRAULICS	-	0
0000048	19.07.91	BENG	UNIVERSITY OF PORTHARCOURT	MECH. ENG.	PROD. ENGINE	1
0000049	12.12.85	PHD	ENUGU STATE UNIVERSITY	PHYSICS	ELECTRONICS	2
0000050	1.07.81	BSc	ONDO STATE UNIVERSITY	CHEMISTRY	-	3
0000051	5.09.80	HND	INSTITUTE OF MANAGMT TECH OG	MASS COMM.	LITERATURE	1

0000052	28.05.95	BSc	IMO STATE UNIVERSITY ABIA	BANKING	BUS.ADMIN	2
0000053	7.03.87	ND	THE POLYTECHNIC IBADAN	GEOLOGY	SCIENCE TECH.	3
0000054	5.11.92	BSc	OBAFEMI AWOLOWO UNIVERSITY	FOOD TECH.	-	2
0000055	7.07.90	HND	FED. POLYTECHNIC ADO-EKITI	FOOD TECH.	-	3
0000055	15.05.94	BSc	UNIVERSITY OF LAGOS	BUS.ADMIN.	-	3
0000056	17.08.80	BSc	UNIVERSITY OF BENIN	MEDICINE	-	2
0000056	25.09.81	HSC	CHRIST SCHOOL ADO-EKITI	ECONOMICS	GEOGRAPHY	3
0000057	10.07.89	HND	THE POLYTECHNIC IBADAN	ACCOUNTANCY	REASERCH METHO.	2
0000057	15.05.94	BSc	UNIVERSITY OF LAGOS	BUS.ADMIN.	(COSIT)	3
0000058	25.09.81	HSc	CHRIST SCHOOL ADO-EKITI	ECONOMICS	GEOGRAPHY	3
0000058	12.08.87	HND	OGUN STATE POLYTECHNIC	IND.MATHS	-	4
0000059	11.05.84	OND	OGUN STATE POLYTECHNIC	IND.MATHS	-	0
0000059	10.07.89	HND	THE POLYTECHNIC, IBADAN	ACCOUNTANCY	RESEARCH METHO.	2
0000060	14.03.83	MSC	DELTA STATE UNIVERSITY	BANKING	-	0
0000060	12.08.87	HND	ONDO STATE POLY. ONO	ACCOUNTANCY	-	2
0000061	11.05.84	OND	OGUN STATE POLYTECHNIC	IND.MATHS	-	4
0000061	17.07.87	MBA	ONDO STATE UNIVERSITY	BUS.ADMIN	-	0
0000062	13.02.82	B.AGRIC	FED.UNI.OF TECH	AGRIC.ECONS	EXTENSION	1
0000063	12.12.87	HND	IBANDAN PPOLYTECNIC	BUS.ADMIN	HISTORY	1
0000064	13.10.86	NCE	FED. COLLEGE OF EDU. EHA-AMUFU	REGLIGION	HAUSA LANG	1
0000065	15.11.90	B ENG	UNIVERSITY OF ILORIN	AGRIC. ENG.	ENVIRON. ENG.	1
0000066	20.06.88	MSC	UNIVERSITY OF BENIN	ACCOUNTANCY	-	0
0000067	15.03.90	HND	FED. POLYTECHNIC,BIDA	BUS. ADMIN	HISTORY	2
0000068	12.07.92	NCE	COLLEGE OF EDU. WARRI	ECONOMICS	GEOGRAPHY	1
0000069	10.07.89	B. ENG	UNIVERSITY OF LAGOS	MECH.ENG	-	2
0000070	15.05.94	BSC	UNIVERSITY OF BENIN	MICRO BIOLOGY	-	2
0000071	20.04.88	HND	FED. POLYTECHNIC. ADO.EKITI	ACCOUNTANCY	-	3
0000072	28.06.84	NCE	COLLEGE OF EDUCATION AGBOR	GEOGRAPHY	-	2
0000073	16.05.87	HND	THE POLITECHNIC IBADAN	BUS. ADMIN	-	2
0000074	24.03.90	MBA	UNIVERSITY OF BENIN	BANKING	-	0
0000075	20.07.85	BSC	DELTA STATE UNIVERSITY ABRAKA	ECONOMICS	-	2
0000076	19.09.94	B TECH	FED. UNIVERSITY OF TECH YOLA	MICROBIOLOGY	BIOLOGY	2
0000077	20.07.91	M.TECH	ENUGU STATE UNIVERSITY OF SCI.& TECH	IND. CHEM	-	3
0000078	15.11.92	BSC	UNIVERSITY OF IBADAN	LANGUAGE	GERMAN	2
0000079	3.03.83	MBBS	UNIVERSITY OF WALES UK	SUGERY	-	0
0000079	2.05.87	BSC	CAMBRIDGE UNIVERSITY UK	AERONAUTICS	MECHANICAL	1
0000080	5.05.85	HND	ONDO STATE POLY. ONO	MASS COMM	-	2
0000081	28.02.84	OND	OGUN POLY ABEOKUTA	LAB TECH	CHEMISTRY	3
0000082	29.05.89	ND	IBADAN POLYTECHNIC	PURCHASING	MARKETING	1
0000083	30.11.90	NCE	IDA COLLEGE OF EDU . KOGI	ENGLISH	LITERATURE	4
0000084	31.01.80	B ENG	UNVERSITY OF NIGERIA NSUKKA	ELECTRICAL	-	3
0000085	4.06.88	PHD	FED.UNIVERSITY OF TECH AKURE	WOOD TECH	-	0
0000086	5.07.89	MSC	UNIVERSITY OF LAGOS AKOKA	INFO TECH	-	0
0000087	6.08.92	BSC	GLASGOW UNIVERSITY UK	MECHATRONICS	ELECTRONICS	1
0000088	12.12.82	BSC	UNIVERSITY OF SHERFFIELD UK	AGRIC SERS	-	2
0000089	2.09.89	OND	ARKANSAS STATE POLY. U.S.A	MGT TECH	-	4
0000090	3.06.87	NCE	FED COLLEGE OF AGRIC UMUAKWO	ANIMAL PROD	-	1
0000091	16.07.92	HND	INSTITUTE OF MGT TECH ENUGU	MASS COMM	ENGLISH	1
0000092	18.03.93	B TECH	FED UNIVERSITY OF TECH OWERRI	BIOCHEM	CHEMISTRY	2
0000093	20.04.97	BSC	UNIVERSITY OF WARSAN POLAND	PHARMACY	-	3
0000094	15.11.97	BSC	UNIVERSITY OF IBADAN	VET. MED	-	2
0000095	16.02.89	MBA	UNIVERSITY OF ABUJA	BUS ADMIN	-	0
0000096	12.03.80	ND	INSTITUTE OF JOURNALISM	PHOTOGRAPHY	-	3
0000097	13.05.90	HND	AMERICAN SCHOOL OF AVITION	METEROLOGY	GEOGRAPHY	4
0000098	1.12.96	BSC	NIGERIAN DEFENCE ACADEMY	ELECTRONICS	-	2
0000099	28.04.95	OND	OGUN STATE POLY ABEOKUTA	MARKETING	PURCHASING	1
0000100	3.06.97	B ENG	FED UNIVERSITY OF TECH AKURE	AGRIC ENG	FOOD PROCESSING	1

APPENDIX B.4 - APPLICANTS' PROFESSIONAL QUALIFICATIONS

APPENDIX B.4.1 - TABLE STRUCTURE

Field Name	Description	Field Type	Width
App-No	Applicant's Number	A	7*
Award-Date	Date of Award	D	8*
Status	Status	A	12
Add-Award	Address of Awarding Body	A	45

APPENDIX B.4.2 - FORM VIEW

APPLICANT'S PROFESSIONAL QUALIFICATION

App. No.:
DATE OF AWARD:
STATUS (TYPE OF MEMBERSHIP):
ADDRESS OF
AWARDING BODY:

APPENDIX B.4.3 - LIST OF RECORDS

App_No	Award_Date	Status	Add_Award
0000016	19.04.94	ASSOCIATE	NIGERIA INSTITUTE OF PURCHASING
0000018	12.09.87	MEMBER	NIGERIA INSTITUTE OF JOURNALISTS
0000020	23.06.90	MEMBER	INSTITUTE OF CHARTERED ACCOUNTANTS OF NIGERIA
0000023	7.07.93	ASSOCIATE	NIGERIA INSTITUTE OF JOURNALISTS
0000027	8.09.85	FELLOW	NIGERIA SOCIETY OF ENGINEERS
0000030	4.03.86	MEMBER	NIGERIA INSTITUTE OF JOURNALISTS
0000031	16.07.90	ASSOCIATE	CHARTERED INSTITUTE OF BANKERS
0000034	23.09.89	MEMBER	NIGERIA INSTITUTE OF MANAGEMENT
0000036	28.01.92	ASSOCIATE	CHARTERED INSTITUTE OF BANKERS
0000037	8.05.91	MEMBER	INSTITUTE OF CHARTERED ACCOUNTANTS OF NIGERIA
0000038	7.05.85	ASSOCIATE	NIGERIA INSTITUTE OF MANAGERS
0000042	23.03.89	MEMBER	NIGERIA INSTITUTE OF SECRETARIES
0000043	4.04.93	FELLOW	COMPUTER ASSOCIATION OF NIGERIA
0000048	5.09.95	MEMBER	COUNCIL FOR REGISTR. OF ENGINEERS IN NIGERIA
0000052	13.02.94	ASSOCIATE	CHARTERED INSTITUTE OF BANKERS
0000057	4.06.92	MEMBER	INSTITUTE OF CHARTERED ACCOUNTANTS OF NIGERIA
0000064	19.08.95	MEMBER	NIGERIA SOCIETY OF ENGINEERS
0000065	9.07.96	ASSOCIATE	NIGERIA INSTITUTE OF MANAGEMENT
0000066	13.12.94	MEMBER	NIGERIA INSTITUTE OF SECRETARIES
0000079	4.09.89	FELLOW	NIGERIA INSTITUTE OF JOURNALISTS
0000082	5.05.96	MEMBER	PUBLIC RELATIONS INSTITUTE OF NIGERIA
0000084	7.07.95	ASSOCIATE	COUNCIL FOR REGISTR. OF ENGINEERS IN NIGERIA

APPENDIX B.5 - APPLICANTS' JOB HISTORY

APPENDIX B.5.1 - TABLE STRUCTURE

Field Name	Description	Field Type	Width
App-No	Applicant's Number	A	7*
Date-last-emp	Date last employed	D	8
Rel-year-exp	Relevant years of Experience	N	
Date-Dis	Date Disengaged	D	8
Last-sal	Last Salary	$	
Cond-Leave	Condition for Leaving	A	12
Job-Code	Previous Job	A	6
Status	Status	A	15
Employer	Employer	A	45
Curr-resp1	Current Responsibility 1	A	15
Curr-resp2	Current Responsibility 2	A	15
Rel-Proj1	Relevant Project 1	A	20
Rel-Proj2	Relevant Project 2	A	20
Tools-Used1	Tools Used 1	A	20
Tools-Used2	Tools Used 2	A	20

APPENDIX B.5.2 - FORM VIEW

KBSMAJ - JOB HISTORY

Applicant's Number

Relevant Years of Experience:

Relevant Project1: Relevant Project2:

Current Responsibility1: Current Responsibility2:

Tools Used1: Tools Used2:

Date Last Employed: Date Disengaged:

Job Code: Status:

Employer:

Last Salary: Condition for Leaving:

APPENDIX B.5.3 - LIST OF RECORDS

App_No	Rel-year-exp	Curr-resp1	Curr-resp2	Rel-proj1	Rel-proj2	Tools-used1
0000001	6	ADMINISTRATION	MEMBER, BOD.	PRIVATIZATION	SOFTWARE INITIATION	COMPUTER
0000002	7	ADMINISTRATION	POLICY IMPLEMTT	PERSONNEL RECRUITMT	SALARY ADJ. COMTEE.	MANUAL OF PROCEDURE
0000003	5	DRILLING	ROCK SAMPLING	BORE-HOLE DRILLING	OIL DRILLING	RIG
0000004	8	MINUTE TAKING	TYPING	TAKING BOD MINUTES	- .	ELECT. TYPEWRITER
0000005	7	MINUTE TAKING	ADMINISTRATION	TAKING BOD MINUTES	MEMBER, DISCP. PANEL	COMPUTER
0000006	5	MINUTE TAKING	TYPING	TAKING BOD MINUTES	-	ELECT. TYPEWRITER
0000007	4	ADMINISTRATION	MONITORING	OIL DRILLING	OIL SPILLAGE MGT	DRILLING EQUIPMENTS
0000008	3	FOOD ANALYSIS	RATION FRMLATN	FOOD POISONING DETEC	FORMULATING RATIONS	LABORATORY EQUIP.
0000009	6	LAB. EQUIP. MNT	SUPERVISING	EQUIP. MAINTENANCE	SUPERVISING PRACT.	MAINTENANCE TOOLKIT
0000010	4	PUBLIC ENLGTMT.	ADMINISTRATION	ENLIGHTENMENT PROG.	-	PUBLIC ADDRESS SYS.
0000011	5	ADMINISTRATION	POLICY MAKING	POLICY IMPLEMENTATN	PERSONNEL RECRUITMT	MANUAL OF PROCEDURE
0000012	5	X-RAY ADMIN.	-	X-RAY EMISSION CTRL	-	X-RAY MACHINES
0000013	4	ADMINISTRATION	SUPERVISING	SUPERVISING PERSONL.	SALARY NEGOTIATION	-
0000014	3	ADMINISTRATION	-	PERSONNEL RECRUITMT	-	MANUAL OF PROCEDURE
0000015	8	DIAGNOSIS	ADMINISTRAION	COMMUNITY HEALTH PRG	PERSONNEL RECRUITMT	STETOSCOE
0000016	4	MNTORING. PURCH	ADMINISTRATION	COMPUTER PURCHASING	-	-
0000017	5	ADMINISTRATION	POLICY MAKING	PERSONNEL RECRUITMT	POLICY IMPLEMENTATN	MANUAL OF PROCEDURE
0000018	4	NEWS REPORTING	LIFE NEWS COVRG	COVERING ELECTIONS	-	CAMERA
0000019	4	PROGRAMMING	SYSTEM ANALYSIS	MS-DOS DESIGN	WINDOWS '95 DESING	COMPUTER
0000020	6	TAX EVALUATION	LEDGER BALANCIN	COMPANY TAX EVALUTN	-	ELECT. CALCULATOR
0000021	8	ADMINISTRATION	DIR. SPORTS COU	MNTORING SPORT EVNTS	-	-
0000022	5	ADMINISTRATION	DIR. SPORTS COU	NIG.SPORTS FESTIVAL	NUGA GAMES OFFICIAL	SPORT EQUIPMENTS
0000023	10	ADMINISTRATION	POLICY IMPLEMTT	PERSONNEL RECRUITMT	-	MANUAL OF PROCEDURE
0000024	6	LAND SURVEYING	MONITORING	PLANNING IJAKPO EST	-	SURVEYING EQUIPMENTS
0000025	4	LECTURING	RESEARCH	ARTICLE PUBLICATION	RESEARCH WORK	LABORARTORY EQUIP.
0000026	5	PUBLIC ENLGTMT.	ADMINISTRATION	ENLIGHTENMENT PROG.	-	PUBLIC ADDRESS SYS.
0000027	3	EQUIP. MAINTEN.	PIPE-LINE MAINT	MACHINE FABRICATION	TURNOVER MAINTENANCE	MAINTENANCE TOOLKIT
0000028	3	ADMINISTRATION	MONITORING	ROAD CONSTR./MAINTEN	CULVET CONSTRUTION	HEAVY-DUTY MACHINERY
0000029	4	LECTURING	RESEARCH	ARTICLE PUBLICATION	BIOTECHNOLOGY RES.	LABORATORY EQUIP.
0000030	7	NEWS COVERAGE	BIOGRAPHY	COUP COVERAGE	ELECTION COVERAGE	CAMERA
0000031	8	AUDIT	LEDGER BALANCIN	FUMB AUDITING	SHELL AUDITING	LEDGERS
0000032	9	DRILLING	ROCK SAMPLING	BORE HOLE DRILLING	OIL DRILLING	RIG
0000033	5	ADMINISTRATION	POLICY IMPLEMEN	PERSONNEL RECRUITMTT	POLICY IMPLEMENTATN	MANUAL OF PROCEDURE
0000034	4	ADMINISTRATION	POLICY EXECUTIO	LABOUR NEGOTIATION	-	MANUAL OF PROCEDURE
0000035	6	TRAINING	RECRUITMENT	TRAINING PROGRAMME	REHABILITATION	TRAINING MANUAL
0000036	4	TAX EVALUATION	LEDGER BALANCIN	COMPANY TAX EVALUATI	MOBIL AUDITING	ELECT. CALCULATOR
0000037	8	AUDIT	LEDGER BALANCIN	COMPANY TAX AUDITING	-	LEDGERS
0000038	5	ADMINISTRATION	POLICY FORMULAT	PERSONNEL RECRUITMEN	SALARY PAYMENT	MANUAL OF PROCEDURE
0000039	4	ADMINISTRATION	POLICY IMPLEMEN	INDUSTRIAL NEGOTIATN	TURNAROUND MGT	DECISION SUPP. SYS
0000040	3	RESEARCH PROG.	LECTURING	ARTICLE PUBLICATION	BIOTECH. RESEARCH	LABORATORY EQUIP.
0000041	4	MINUITE TAKES	TYPING	BOARD MINUITE TAKES	-	COMPUTER
0000042	5	MINUITE TAKING	TYPING/SHORTHAN	BOARD MEETING TAKING	-	COMPUTER
0000043	8	PROGRAMMER	ANALYST	DESIGN COMP.PACKAGES	ANALYSE NSE SYSTEM	PARADOX3
0000044	6	TEACHING	RESEARCH	STUDY MGT. PATTERNS	DESIGN MOTIVTN SCHME	MGT BOOKS
0000045	4	LECTURING	RESEARCH	ARTICLE PUBLICATION	PHYSICS RESEARCH	LABORATORY EQUIP.
0000046	3	PUBLIC ENLIGHTE	ADMINISTRATION	ENLIGHTENMENT PROG.	-	PUBLIC ADDRESS SYS.
0000047	4	LECTURING	RESEARCH	ARTICLE PUBLICATION	BIOLOGY RESEARCH	LABORATORY EQUIP.
0000048	5	SUPERVISOR	LAB. ADMINISTRA	EQUIPMENT MAINTAINAN	SUPERVISING PRACTICE	LAB. TOOLKIT
0000049	5	EQUIP. MAINTAIN	PIPE-LINE MAINT	MACHINE FABRICATION	TURNOVER MAINTAINANC	MAINTAINANCE TOOLKIT
0000050	7	DRUG PRESCIPTIO	PATIENT ANALYST	DRUG MAINTAINANCE	-	MYCIN
0000051	2	TEACHING	RESEARCH	UN POPULATN STUDY	MEMBER SENATE	PROJECTOR
0000052	5	ADMINISTRATION	BANKING	CUSTOMER SERVICES	LABOUR NEGOTIATIONS	MANUAL OF PROCEDURE
0000053	7	ACCOUNTING	BANKING	ENDYEAR FIN.INVENTRY	CBN CLEARING	CLEARING MANUAL
0000054	2	TYPING	MINUTE TAKING	COVERING BOD MEETING	-	TYPEWRITER

Tools-used2	Date-last-emp	Date-dis	Job-code	Status	Employer
-	12.07.86	14.06.89	000005	DIRECTOR	IBM COMPUTER LTD., CALABAR.
POLICY GUIDELINES	10.05.92	25.07.96	000012	MANAGER	SHELL PETROLEUM DEV CO., PORT-HARCOURT.
DRILLING EQUIPMENT	6.07.90	30.04.97	000013	GEOLOGIST	WESTERN GEOPHYSICAL CO., ASABA.
COMPUTER	12.03.85	13.06.89	000001	SECRETARY	GATEWAY INSURANCE LTD., IKEJA.
-	13.09.86	10.05.92	000002	SECRETARY	SHERATON HOTELS LTD., ABUJA.
COMPUTER	22.01.83	14.06.89	000003	SECRETARY	FIRST BANK LTD., UYO.
-	14.06.89	16.03.93	000018	OPS MANAGER	CHEVRON NIG. LTD., LAGOS.
-	3.05.84	28.05.93	000015	NUTRITIONIST	FOOD SPECIALTIES (NESTLE),ABEOKUTA.
-	28.06.93	3.07.97	000024	LAB TECH	MEDICHEM LABORATORIES LTD., KANO.
-	17.05.84	17.07.90	000012	EXT OFFICER	MITCHEL FARMS LTD., IKARE.
-	20.06.89	16.11.92	000011	MANAGER	MOBIL OIL PRODUCING CO LTD., EKET.
-	16.11.90	13.03.94	000010	PHYSICIST	RADIOLOGICAL LABORATORY CENTRE, AKURE.
-	21.03.87	30.08.89	000009	SURPERVISOR	WARRI LOCAL GOVERNMENT AREA, WARRI.
-	31.01.86	17.05.89	000007	MANAGER	FEDERAL CAPITAL DEV AUTHORITY, ABUJA.
B.P.APPARATUS	27.03.89	20.04.95	000011	MED DOCTOR	CENTRAL HOSPITAL, BENIN CITY.
-	15.07.90	17.03.93	000021	PURCH. MANAGER	SHELL PETROLEUM DEV. CO. LTD., LAGOS.
POLICY GUIDELINES	12.04.88	18.02.92	000008	MANAGER	RAYCON NIG LTD., ENUGU.
TAPE RECORDER	3.07.89	13.11.94	000001	REPORTER	DAILY TIMES NIG LTD., SOKOTO.
C++	4.06.87	7.10.91	000002	PROGRAMMER	IBM COMPUTER LTD., KANO.
-	3.04.92	14.11.95	000003	ACCOUNTANT	ALLIED BANK NIG LTD., JOS.
-	7.03.94	4.07.97	000004	SPORTS DIR	UNIVERSITY OF BENIN, BENIN CITY.
COMPUTER SPORTS	3.11.91	3.07.96	000005	SPORTS DIR	AKURE SPORS COUNCIL, AKURE.
POLICY GUIDELINES	13.02.96	4.03.98	000006	MANAGER	N.T.A. LAGOS.
-	8.06.88	16.07.91	000007	SURVEYOR	RAYCON NIG LTD., ONITSHA.
-	13.05.92	15.06.96	000008	LECTURER	UNIVERSITY OF LAGOS, AKOKA, LAGOS.
-	6.05.90	17.12.94	000009	EXT OFFICER	MITCHEL FARMS LTD., OSHOGBO.
-	3.10.88	20.04.91	000010	MECH ENGINEER	MOBIL OIL PRODUCING NIG ULTD., WARRI.
-	17.06.89	14.05.93	000011	OPERATIONS MGR.	MEDEC INTERNATIONAL LTD., OWERRI.
-	24.09.90	16.07.95	000012	LECTURER	ONDO STATE UNIVERSITY, ADO-EKITI.
COMPUTER	16.04.92	14.05.97	000013	JOURNALIST	THE GUARDIAN NEWS PAPER,ONDO.
AUDIT PACKAGES	17.08.87	12.10.93	000014	ACCOUNTANT	UNION BANK NIG. LTD., ILORIN.
DRILLING EQUIPMENT	15.04.95	4.06.98	000015	GEOLOGIST	UNITED GEOPHYSICAL CO LTD., LAGOS.
POLICY GUIDELINES	13.09.89	14.07.91	000017	MANAGER	CADBURY NIG LTD., MINNA.
POLICY GUIDELINES	12.11.85	17.06.89	000018	MANAGER	NIGERIAN BOTTLING CO. LTD., ABA.
-	13.04.88	12.03.90	000008	GEOPHYSICIST	SCHLUMBERGER NIG LTD.,PORT-HARCOURT.
LEDGERS	12.04.90	13.04.89	000005	ACCOUNTANT	UNITED BANK FOR AFRICA, CALABAR.
AUDIT PACKAGES	27.03.89	14.05.90	000015	ACCOUNTANT	DIAMOND BANK LTD., YOLA.
POLICY GUIDELINES	31.07.86	31.07.88	000021	BANK MANAGER	UNION BANK NIG LTD., IKOT-ABASI.
MANAGEMENT. INFO.SYS	24.06.87	14.03.94	000006	MANAGER	AGIP NIG LTD., ORE.
RESEARCH BOOKS	16.07.90	22.01.92	000025	LECTURER	UNIVERSITY OF CALABAR, CALABAR.
ELECTRIC TYPEWRITER	15.06.89	16.03.95	000004	SECRETARY	CADBURY NIG LTD., LOKOJA.
NOTEPAD/PENCIL	20.07.93	23.04.96	000007	SECRETARY	SCOA NIG LTD., ASABA.
COMPUTER	14.03.89	25.12.92	000019	COMPUTER PROGMT	IBM COMPUTERS LTD., ZARIA.
COMPUTER	20.01.87	30.06.91	000002	LECTURER	UNIVERSITY OF NIGERIA, NSUKKA.
REFERENCE MANUALS	17.03.88	16.03.94	000005	EXT OFFICER	EDEWOR FARMS LTD., IDANRE.
-	15.05.89	28.04.91	000018	LECTURER	UNIVERSITY OF IBADAN, IBADAN.
REFERENCE BOOKS	17.06.97	14.06.98	000013	LAB TECH	MARAS LAB LTD., GOMBE.
-	23.04.89	13.09.94	000002	ENGINEER	RAYCON NIG LTD.,JALINGO.
-	30.12.90	12.07.95	000016	PHARMACIST	CENTRAL HOSPITAL, WARRI.
MIMM	24.09.92	14.08.97	000010	LECTURER	FED. UNIV. OF TECH., AKURE.
VCR	16.10.95	13.06.98	000014	MED DOCTOR	STATE HOSPITAL, AKURE.

Tools-used2	Date-last-emp	Date-dis	Job-code	Status	Employer
INDUTRIAL LAW MANUAL	18.06.87	12.03.92	000009	MANAGER	EKO BANK LTD., LAGOS.
COMPUTER	14.03.94	6.07.98	000001	ACCOUNTANT	ALLIED BANK NIG LTD., AWKA.
COMPUTER	10.03.89	15.06.91	000019	SECRETARY	PRIDCA NIG LTD., BIRNIN-KEBBI.
C++	4.05.87	10.11.89	000024	LECTURER	UNIVERSITY OF LAGOS, AKOKA, LAGOS.
COMPUTER	8.06.89	14.05.92	000011	MANAGER	UNION BANK LTD., KATSINA.
ACCTOUNTING MANUALS	10.06.85	17.06.90	000016	ACCOUNTANT	AFRICAN CONT. BANK LTD., OGUTA.
ROCK SAMPLER	4.06.84	16.04.89	000020	LECTURER	FED. UNIV. OF TECH., AKURE.
MANUAL OF PROCEDURE	4.08.84	14.07.87	000017	MANAGER	OCEANIC BANK LTD., ABUJA.
COMPUTER	5.11.91	24.11.93	000002	SECRETARY	OWENA MASS TRANS., AKURE.
MANUAL OF PROCEDURE	13.02.90	4.05.92	000007	MANAGER	IBRU SEA FOODS,OWERRI.
-	4.05.87	3.06.90	000016	SECRETARY	MEDEC INTERNATIONAL LTD.,DUTSE.
-	13.06.91	17.04.95	000019	PRIEST	ST. ALBERT'S CATHOLIC CHURCH, FUTA.
ENGINEERING EQUIPMTS	4.05.89	20.03.92	000023	ENGINEER	MITCHEL FARMS LTD., SOKOTO.
COMPUTER	21.08.91	19.04.93	000004	MANAGER	FIRST BANK LTD.,EHOR.
COMPUTER	23.07.87	16.01.89	000001	COMPANY SEC.	GATEWAY INSURANCE LTD.,MAKURDI.
BENDING MACHINE	20.11.91	10.08.95	000012	LECTURER	UNIVERSITY OF JOS, JOS.
COMP. AIDED DESIGN	4.08.89	13.04.91	000011	ENGINEER	CHEVRON NIG LTD., PORT-HARCOURT.
SALES GUIDELINES	11.10.94	17.01.98	000003	MANAGER	CADBURY NIG LTD., KANO.
POLICY GUIDELINES	12.09.93	4.06.96	000004	ACCOUNTANT	WEMA BANK LTD., AKURE.
TYPEWRITER	14.03.91	3.11.97	000013	SECRETARY	AMCEDEM NIG LTD., ABA.
BANKING MANUAL	3.01.94	2.02.98	000002	MANAGER	UNION BANK NIG LTD.,UYO.
ARTIFICIAL BREEDER	6.02.89	3.04.93	000009	LECTURER	UNIVERSITY OF UYO, UYO.
TEST TUBES	7.03.87	12.03.90	000016	MICROBIOLOGIST	CADBURY NIG LTD.,LAGOS.
COLOUR ANALYSER	4.05.88	13.04.92	000024	CHEMIST	WEST AFRICAN PAINT LTD., ABA.
SPRAYING MACHINE	10.06.89	14.05.96	000014	LECTURER	UNIVERSITY OF PORT-HARCOURT,PH.
SURGICAL EQUIPMENT	15.07.88	3.04.89	000008	MED DOCTOR	UNIV. TEACHING HOSPITAL, LAGOS.
HELICOPTER	16.07.84	16.03.92	000005	PILOT	NIGERIA AIRWAYS,LAGOS.
COMPUTER	17.03.85	10.11.93	000022	JOURNALIST	THE PUNCH NATIONAL PAPER, MINNA.
GENOTYPE ANALYSER	15.09.91	12.11.96	000001	LAB TECH	MEDICHEM LAB LTD., ONITHSA.
MGT. INFO. SYSTEMS	17.04.92	3.07.97	000009	MANAGER	OILPEST LTD., UMUAHIA.
CONSTITUTION	15.06.87	4.06.91	000003	AMBASSADOR	FED. PEP. OF TOGO, TOGO.
VOLTMETER	20.03.89	13.12.92	000007	ELECT ENGINEER	CABEL METAL LTD., IBADAN.
MOER	14.06.95	20.04.98	000015	MANAGER	ONDO STATE FORESTRY RESERVE, AKURE.
CAMERA	6.07.88	14.01.93	000017	REPORTER	NIGERIAN TELEVISION AUTHORITY, IBADAN.
VOLTMETERS	5.04.94	3.04.95	000011	ELECT ENGINEER	PHILIPS ELECT. LTD., ONO.
BILLS/POSTERS	6.06.88	4.03.93	000005	EXT OFFICER	MITCHEL FARMS LTD., OKA.
SPSS	4.05.93	30.06.98	000001	MANAGER	MEDEC INTERNATIONAL LTD., ORE.
FGN POLICY GUIDELINE	3.11.89	4.12.93	000012	MANAGER	FED. CAPITAL DEV. AUTHORITY, ABUJA.
NUJ BYE-LAWS	13.08.86	3.08.92	000016	JOURNALIST	DAILY TIMES NEWSPAPER,OTUKPO.
ROTARY EVAPORATOR	16.04.85	23.01.89	000020	BIOCHEMIST	CADBURY NIG LTD.,LAGOS.
CHEMICAL ANALYSER	3.07.94	6.04.98	000022	PHARMACIST	U.B.T.H., BENIN CITY.
DIAGNOSTIC TOOLS	23.04.89	14.08.95	000009	VET DOCTOR	VETERNERY HOSPITAL , WARRI.
NOTEPAD	10.04.89	13.04.93	000013	SECRETARY	AMCEDEM NIG LTD., ASABA.
-	9.03.87	14.03.91	000004	RADIOLOGIST	REWANE X-RAY SERVICE, APAPA.
RAIN GUAGE	10.06.91	16.08.97	000024	METEOROLOGIST	NIGERIA AIRWAYS,KANO.
VOLTMETER	14.08.84	15.11.89	000011	ELECT ENGINEER	NIGERIAN DEFENCE ACADEMY,KADUNA.
FGN COMPENSATN. DOC	3.04.92	14.06.96	000006	MANAGER	MOBIL OIL PRODUCING NIG. ULTD., EKET.
SLEDGE HAMMER	15.06.95	3.04.98	000009	AGRIC ENGINEER	IBRU SEA FOOD LTD., AKURE.
INDUSTRIAL GAS	15.06.95	3.04.98	000003	MECH ENGINEER	OKITUPUPA WATER ENGINEERING SERVVICES,ONDO

Last_Sal	Cond_Leave
80,000.00	SACKED
100,000.00	RETRENCHED
75,500.00	FURTHER STUD
60,000.00	RETIRED
63,000.00	RETIRED
70,000.00	WITHDRAWAL
90,500.00	RETIRED
80,500.00	RESIGNED
70,000.00	RESIGNED
75,000.00	SACKED
120,000.00	RETRENCHED
99,500.00	RESIGNED
64,500.00	FURTHER STUD
110,000.00	RETIRED
95,500.00	RESIGNED
100,000.00	WITHDRAWAL
120,500.00	RETRENCHED
85,000.00	RETRENCHED
98,500.00	RETIRED
125,000.00	FURTHER STUD
83,500.00	SACKED
75,000.00	WITHDRAWAL
90,000.00	RETIRED
76,000.00	RESIGNED
85,000.00	RESIGNED
60,000.00	RESIGNED
130,000.00	FURTHER STUD
98,500.00	RESIGNED
70,000.00	RETRENCHED
88,000.00	WITHDRAWAL
100,000.00	WITHDRAWAL
110,500.00	RETIRED
95,000.00	RESIGNED
95,000.00	FURTHER STUD
135,000.00	FURTHER STUD
100,500.00	SACKED
97,500.00	WITHDRAWAL
100,000.00	FURTHER STUD
100,000.00	RETRENCHED
90,500.00	RETRENCHED
65,500.00	RETRENCHED
60,000.00	RETIRED
80,000.00	FURTHER STUD
98,500.00	RESIGNED
70,000.00	RETIRED
75,000.00	FURTHER STUD
60,000.00	SACKED
100,000.00	RETIRED
80,000.00	RETIRED
90,000.00	WITHDRAWAL
85,000.00	WITHDRAWAL

Last_Sal	Cond_Leave
120,000.00	WITHDRAWAL
115,000.00	RETRENCHED
65,000.00	SACKED
70,000.00	WITHDRAWAL
130,000.00	FURTHER STUD
90,500.00	RETIRED
80,000.00	RETIRED
95,500.00	RESIGNED
75,000.00	RETRENCHED
80,000.00	WITHDRAWAL
60,000.00	RETIRED
100,000.00	RETRENCHED
75,000.00	RETRENCHED
90,000.00	FURTHER STUD
67,500.00	WITHDRAWAL
80,000.00	RESIGNED
150,000.00	RESIGNED
125,000.00	RESIGNED
110,000.00	SACKED
70,000.00	SACKED
140,000.00	RETIRED
100,000.00	RETRENCHED
90,000.00	FURTHER STUD
120,000.00	WITHDRAWAL
85,000.00	WITHDRAWAL
130,000.00	RESIGNED
95,000.00	RETIRED
80,500.00	SACKED
60,500.00	SACKED
75,500.00	WITHDRAWAL
140,000.00	FURTHER STUD
120,500.00	FURTHER STUD
85,000.00	RETRENCHED
70,000.00	FURTHER STUD
90,500.00	RETIRED
88,500.00	RESIGNED
78,500.00	RESIGNED
125,000.00	WITHDRAWAL
85,000.00	FURTHER STUD
90,000.00	RETRENCHED
100,500.00	RETRENCHED
95,000.00	RETRENCHED
80,000.00	RETIRED
70,000.00	RESIGNED
75,000.00	WITHDRAWAL
80,000.00	FURTHER STUD
130,500.00	RESIGNED
100,000.00	SACKED
89,500.00	RETRENCHED

APPENDIX B.6 - ORGANISATIONS FILE

APPENDIX B.6.1 - TABLE STRUCTURE

FIED NAME	DESCRIPTION	FIELD TYPE	WIDTH
Org_No	Organisation Number	A	6*
Name	Organisation Name	A	30
Address	Address of Organisation	A	45
Tel_No	Telephone Number	A	10
Line_of_Trade	Line of Trade	A	20

APPENDIX B.6.2 - FORM VIEW

INFORMATION ON ORGANISATIONS
Organisation's Number: Organisation's Name: Address: Telephone Number: Line of Business:

APPENDIX B.6.3 - LIST OF RECORDS

23.02.98 ORGANISATIONS' INFORMATION Page 1

Org_No	Org_Name	Address	Tel	Bus_line
100001	FIRST BANK PLC	23,LAWANI ROAD, SURULERE, LAGOS	01-2456789	BANKING
100002	LAAS SHIPPING LINE	56,AKOBI CRESCENT, OFF IDIORO, LAGOS	10-4521954	SHIPPING
100003	OLUWA GLASS INDUSTRY	OLUWA ROAD IGBOKODA,ONDO STATE	09-5647453	MARKETING
100004	AGGREGATE GRP. OF COMPANIES	67 USELU ROAD, BENIN CITY	052-245490	MANAGEMENT
100005	NATH. AGRIC. LAND DEVT. AUTH	ALGBAKA QUARTERS, AKURE, ONDO STATE	034-232567	AGRICULTURE
100006	EBUN INDUSTRIES LIMITED	1, OLD IFE ROAD, IBADAN, OYO STATE	02-237890	MANUFACTURING
100007	ED & F MAN LTD, AKURE	23, FEMI ALEWI STREET, AKURE, ONDO STATE	034-242611	EXPORTATION
100008	FOOD SPECIALITIES (NESTLE)	45, INDUSTRIAL ESTATE, ILUPEJU, LAGOS	01-4545981	MANUFACTURING
100009	TRADEWORLD FINANCE LIMITED	34, RUMOLA STREET, PORT HARCOURT, RIVERS	084-568019	FINANCE
100010	UNIVERSITY PRESS LIMITED	UNIVERSITY OF IBADAN, OYO STATE	022-234111	PUBLISHING
100011	F. A. O.OSEKITA & CO	62, ABRIBA STREET, UMUAHIA, ABIA STATE	088-220159	AUDITING
100012	MODRAJI HOLDINGS COMPANY	PLOT 34, GRA, IKEJA, LAGOS		TRADING
100013	CHURCHGATE NIG LIMITED	56, YAKUBU GOWAN WAY, JOS, PLATEAU STATE	073-611555	MANUFACTURING
100014	SHELL PETROLEUM DEVT. CO	14, OLD ABA ROAD, RUMUMASI, P.H, RIVERS	084-289006	EXPLORATION
100015	KRAGHA AND ASSOCIATES	56,AIRPORT ROAD, WARRI, DELTA STATE		DRILLING
100016	WEST AFRICAN EXAM COUNCIL	WAEC BUILDING YABA, LAGOS		EXAMINATION
100017	GARVET ANIMAL CLINIC	20 TAFAWA BELEWA ROAD, JOS, PLATEAU	073-555777	VERTINERY
100018	UNITED BANK FOR AFRICA	BROAD STREET, LAGOS, LAGOS STATE	01-2668791	BANKING
100019	FADEX TECHNICAL SERVICES LTD	10, ENEKE ROAD, OGUTA, IMO STATE	083-420578	TECHNICAL
100020	THE PUNCH, IKEJA	25, AIRPORT ROAD IKEJA	01-8772000	PUBLISHING
100021	BENIN OWENA RIVER BASIN DEVT.	KM 24, BENIN WARRI ROAD, BENIN CITY		WATER RESOURCES
100022	AWOSIKA COLLEGE,ONDO	P. O. BOX 298, ONDO, ONDO STATE		EDUCATION
100023	RICH ROTOYE GROUP	TOYIN BUILDING, AKURE, ONDO STATE		FINANCE
100024	NIGERIAN AIRWAYS	NIGERIAN AIRPORT, ABUJA		AVIATION
100025	BLUE LAKES NIGERIA LIMITED	1, OLANIYI STREET, IDIORO, LAGOS	01-830722	MARKETING

APPENDIX B.7 - JOB REQUIREMENTS FILE

APPENDIX B.7.1 - TABLE STRUCTURE

FIELD NAME	DESCRIPTION	FIELD TYPE	WIDTH
Org_No	Organisation number	A	6*
Job_Code	Job Code	A	6*
Job_Title	job Title	A	15
Vacancy	Number of Vacancies	N	
Qual_Reqa	Academic Qualification Required	A	20
. Class	Class	N	
Subj	Subject	A	15
Date_Awarda	Date of Award of Acad Qual	D	8
Qual_Reqp	Professional Qualification Required	A	25
Status	Status	A	20
Date_Awardp	Date of Award	D	8
Exp_Req	Experience Required	N	
Curr Respons	Current responsibilities	A	15
Rel_Proj	Relevant Projects	A	20
Tools_used	Tools Used	A	20
Min_Age	Minimum Age	N	
Max_Age	Maximum Age	N	
Sex	Sex	A	1
Marital_Status	Marital Status	A	3
State_Origin	State of Origin	A	15
. Salary	Salary	$	
benefits	benefits	A	15

APPENDIX B.7.2 - FORM VIEW

KBSMAJ - JOB REQUIREMENT SUBMENU

Organisation No:: Job Code: Job Title: Vacancy
Academic Qual-Req: Class:
Subject: Date of Award:
Prof. Qual : Status:
Date of Award: Experience Req:
Current Responsibility: Related Project:
Tools Used:
Minimum Age: Maximum Age: Sex: Marital Status:
State of Origin: Salary;
Benefits:
Intelligence Test: Aptitude Test: Physical Test:

APPENDIX B.7.3 - LIST OF RECORDS

ORG_No	Job_Code	Job_Title	Vacancy	Qual_Reqs	Class	Maj-sub	Qual_reqp	Status	Exp_Req	Curr-respons	Rel-proj
100001	000001	COMP.MANAGER	2	BSC	3	COMPUTER	-	-	2	MANAGER	PROGRAMMI
100002	000003	SECRETARY	3	OND	3	SEC ADMIN	-	-	1	SECRETARY	TYPING
100003	000006	PHARMACIST	1	BSC	2	PHARMACY	-	-	3	PHARMACIST	PHARMACEU
100004	000011	CONSULTANTS	2	MBA	0	MANAGEMENT	NIM	MEMBER	3	CONSULTANT	CONSULTAN
100005	000010	CROP SCIENTISTS	4	HND	3	CROP PRODUCTION	-	-	2	RESEARCHER	CROP HYBR
100006	000017	CIVIL ENGINEERS	1	B ENG	2	CIVIL ENG	COREN	ASSOCIATE	1	PRINCIPAL ENG	BRIDGE CO
100007	000001	MANAGER	1	BSC	2	MARKETING	-	-	5	MANAGER	MARKETING
100007	000003	SECRETARY	1	HND	3	SEC ADMIN	-	-	3	SECRETARY	TYPING
100008	000023	TRAINERS	2	BED	2	FOOD TECH	-	-	3	TRAINER 1	PUBLIC HE
100009	000002	ACCOUNTANTS	3	BSC	3	ACCOUNTING	ICAN	MEMBER	2	ACCTING OFFICER	TAX EVALU
100010	000014	BINDERS	4	OND	3	PRINTING TECH	-	-	3	BINDER	BOOK PRIN
100010	000021	ACCT.CLERKS	4	OND	3	ACCOUNTING	-	-	1	CLERICAL OFFICER	LEDGER BA
100011	000011	AUDITORS	2	BSC	2	ACCOUNTING	ICAN	MEMBER	3	AUDITING OFFICER	COMPANY A
100012	000009	SALES MANAGER	1	MBA	0	MARKETING	-	-	5	SALES REP.	MARKETING
100013	000015	DESIGNERS	3	HND	3	FINE ARTS	-	-	2	DESIGNER	TEXTILE D
100014	000018	MECH ENGINEERS	2	B TECH	2	MECH. ENG	NSE	MEMBER	3	FIELD ENGINEER	OIL PIPE
100014	000019	ELECT. ENGINEER	3	BSC	2	ELECT. ENG	NSE	MEMBER	2	RIG ENGINEER	ELECT. IN
100015	000001	COMP.MANAGER	1	BSC	2	COMPUTER	-	-	5	MANAGER	PROGRAMMI
100016	000019	ELECT.ENGINEERS	2	B TECH	2	ELECT. ENG	COREN	MEMBER	3	ENGINEER II	MACHINE M
100017	000021	ACCT. CLERKS	3	OND	3	ACCOUNTING	-	-	2	CLERICAL OFFICER	LEDGER BA
100018	000006	PHARMACIST	1	B PHARM	0	PHARMACY	-	-	2	PHARMACIST	PHARMACEU
100019	000004	TECHNOLOGISTS	2	HND	3	MECH. TECH	-	-	3	CHIEF TECHNOLOGY	EQUIPMENT
100020	000013	CARTOONISTS	2	HND	3	FINE ARTS	-	-	1	GRAPHIC DESIGNER	GRAPHIC D
100021	000018	MECH. ENGINEERS	3	B ENG	2	MECH. ENG	NSE	MEMBER	3	FIELD ENGINEER	DAM CONST
100022	000007	SNR. LECTURES	2	PHD	0	CHEMISTRY	CSN	ASSOCIATE	10	LECTURER II	ORGANIC A
100023	000020	AUDITORS	2	BSC	2	ACCOUNTING	ICAN	STUDENT	5	AUDITING OFFICER	COMPANY A
100024	000019	ELECT.ENGINEERS	3	B ENG	2	ELECT. ENG	NSE	MEMBER	3	PRINCIPAL ENG	ELECT. MA
100025	000010	CROP SCIENTISTS	2	BSC	3	CROP PRODUCTION	-	-	2	CASH CROP MKTING	CASH CROP

	Tools-used	Min_age	Max_age	Sex	Marital_status	State-origin	Salary	Benefits
NG	COMPUTER	25	35	A	ALL	ALL	100,000.00	CAR + DRIVER
	COMPUTER	23	30	F	ALL	ALL	46,000.00	HOUSING
TICAL ADMIN	-	27	40	A	M	ALL	155,500.00	HOUSING
CY	-	30	45	M	ALL	ALL	250,000.00	CAR
IDING	-	25	45	M	ALL	ALL	56,000.00	
NSTRUCTION	CONSTRUCTION EQUIP.	30	40	M	S	ALL	76,000.00	FREE MEDICAL
	-	35	45	A	ALL	ALL	95,500.00	CAR +DRIVER
	COMPUTER	25	35	A	ALL	ALL	56,000.00	FREE MEDICAL
LIGHTENMENT	PROJECTOR	27	35	A	ALL		86,000.00	
ATION	MONEY COUNT	25	40	A	ALL	ALL	105,000.00	
TING	BINDING MACHINE	27	35	M	ALL	ALL	40,000.00	
LANCING	CALCULATOR	22	30	A	ALL		42,000.00	
UDITING	AUDIT MANUAL	30	45	A	ALL		78,000.00	FREE LUNCH
	-	27	40	F	ALL		142,000.00	CAR + DRIVER
ESIGNING	CAD	24	30	A	ALL		60,000.00	
MAINTENANCE	MAINTENANCE EQUIP.	25	35	M	ALL	ALL	130,000.00	FREE LUNCH
STALLATION	ELECT. TOOLKIT	27	40	M	ALL	ALL	143,000.00	HOUSING
NG	COMPUTER	35	45	M	ALL	ALL	165,000.00	CAR + DRIVER
AINTENANCE	ELECT. TOOLKIT	25	35	A	ALL	ALL	140,000.00	CAR
LANCING	CALCULATOR	22	35	F	ALL		42,500.00	
TICAL ADMIN	STAT. PACKAGES	27	35	F	ALL		95,000.00	HOUSING +UTILITIES
REPAIRS	MECH. TOOLKIT	27	35	M	ALL		68,000.00	FREE MEDICAL
ESIGNS	CAD	30	37	A	ALL		75,000.00	
RUCTION	HEAVY MACHINERY	28	35	M	ALL		90,000.00	CAR
NALYSIS	SPECTROMETERS	35	60	A	ALL		65,000.00	HOUSING
UDITING	AUDIT MANUAL	25	35	A	ALL		62,000.00	FREE LUNCH
INTENANCE	ELECT. TOOLKIT	27	35	M	ALL		95,400.00	CAR
EXPTATION	-	27	35	A	ALL		80,000.00	INSURANCE

Int-test	Apt-test	Phy-test
65	65	60
55	56	60
60	63	65
65	65	60
58	60	62
68	68	64
62	67	60
56	60	60
50	56	57
54	54	60
52	50	50
50	56	55
66	65	58
65	61	64
56	55	50
65	65	67
63	60	55
67	68	62
64	61	55
51	55	54
60	63	58
58	60	55
58	60	62
63	65	59
65	65	58
63	60	57
60	60	57
53	60	62

APPENDIX B.8 - APPLICANTS' PROFICIENCY FILE

APPENDIX B.8.1 - TABLE STRUCTURE

FIELD NAME	DESCRIPTION	FIELD TYPE	WIDTH
App_No	Applicant's Number	A	7*
Job_No	Job Number	A	6*
Aptitude	Aptitude Test	N	
Intelligence	Intelligence Test	N	
Physical	Physical Test	N	

APPENDIX B.8.2 - FORM VIEW

APPLICANT'S PROFICIENCY INFORMATION
Applcant's Number: Job Number: Aptitude Test: Intelligence Test: Physical Test:

APPENDIX B.8.3 - LIST OF RECORDS

App_No	Job_No	Aptitude	Inteligence	Physical
0000001	000001	56	78	67
0000002	000001	67	80	35
0000003	000001	56	70	43
0000004	000003	78	56	89
0000005	000003	56	59	49
0000006	000002	45	67	58
0000007	000002	45	45	56
0000008	000004	56	67	65
0000009	000001	76	78	76
0000010	000002	34	98	56
0000011	000003	56	55	35
0000012	000004	76	66	67
0000013	000001	87	76	77
0000014	000020	98	67	65
0000015	000021	34	35	56
0000016	000011	56	68	44
0000017	000010	78	78	67
0000018	000010	65	56	33
0000019	000006	45	45	67
0000020	000003	55	65	46
0000021	000002	66	76	27
0000022	000001	28	67	85
0000023	000010	90	45	46
0000024	000015	57	77	66
0000025	000020	87	88	43
0000026	000021	57	65	76
0000027	000001	45	45	65
0000028	000002	65	67	35
0000029	000019	76	67	23
0000030	000001	87	67	56
0000031	000001	65	75	77
0000032	000003	45	87	76
0000033	000004	67	45	45
0000034	000003	89	67	65
0000035	000011	26	36	76

0000036	000001	76	75	65
0000037	000001	98	86	78
0000038	000002	87	65	65
0000039	000020	76	45	66
0000040	000021	75	56	75
0000041	000004	74	66	46
0000042	000004	73	46	87
0000043	000011	23	76	88
0000044	000006	56	87	77
0000045	000003	78	45	89
0000046	000010	56	78	67
0000047	000005	56	56	65
0000048	000021	78	66	76
0000049	000020	98	55	66
0000050	000006	78	65	55
0000051	000011	67	67	65
0000052	000001	76	45	46
0000053	000007	56	34	88
0000054	000013	65	77	66
0000055	000008	45	55	45
0000056	000011	64	67	77
0000057	000023	57	75	44
0000058	000002	67	74	88
0000059	000002	87	73	96
0000060	000002	89	62	35
0000061	000002	87	63	25
0000062	000011	86	52	67
0000063	000024	67	45	56
0000064	000025	86	67	85
0000065	000017	75	88	77
0000066	000008	65	60	87
0000067	000001	57	64	36
0000068	000003	54	70	67
0000069	000007	45	44	86
0000070	000003	65	65	46
0000071	000005	67	76	35
0000072	000001	45	78	78
0000073	000020	34	45	55
0000074	000024	23	56	76
0000075	000020	16	57	45
0000076	000021	87	58	56
0000077	000012	45	87	76
0000078	000006	54	66	34
0000079	000009	65	87	66
0000080	000018	65	24	77
0000081	000019	36	65	56
0000082	000014	87	76	76
0000083	000012	57	77	55
0000084	000009	86	45	77
0000085	000006	57	56	46
0000086	000002	78	67	98
0000087	000019	97	78	76
0000088	000017	78	73	84
0000089	000015	67	72	45
0000090	000005	65	34	66
0000091	000003	45	56	76
0000092	000002	64	45	76
0000093	000008	81	46	45
0000094	000001	16	78	66
0000095	000021	79	76	79
0000096	000023	45	65	65
0000097	000025	56	47	74
0000098	000002	78	67	71
0000099	000007	79	78	35
0000100	000008	45	54	66