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**LA THÈSE A ÉTÉ
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The "JOB-BANK SYSTEM"
at the Canada Employment Centre at
Concordia University

Ahmed Mahmoud Mohamed Elsayed

A Major Technical Report

in

The Department

of

Computer Science

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Computer Science at
Concordia University
Montréal, Québec, Canada

November 1984



Ahmed Mahmoud Mohamed Elsayed, 1984

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Abstract

The "JOB-BANK SYSTEM"
at the Canada Employment Centre
at Concordia University

Ahmed Mahmoud El-sayed

The objective of this project is to develop a user-interface system at the Canada Employment Centre at Concordia University. The new 'JOB-BANK' system has been implemented on a VAX-11/750 and the programs have been written in FORTRAN, using the menu-selection and display-format dialogue techniques. The new system was designed to create and verify at any given time the status of the student data or the information on each available job at the Employment Centre. So the 'JOB-BANK' system has been implemented to help the student hunt for a job from the job announcements available at the Employment Centre at Concordia University. The system also helps the counsellor who interviews the student, to handle the student's information in an efficient way.

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Chapter 1

Introduction

Today, man-machine communication is an interactive process. The form of the process is a dialogue; it is controlled via the medium of a language. The user composes his query at a terminal and expects a reply in seconds or, at most, minutes. To design a man-computer interface first we need to identify the problems that lie in the interface between the user and the computer. Then we design a solution in a way that the user finds natural. So, the purpose of the man-machine communication is to meet the needs of the user.

In this chapter we first explain the purpose of man-machine communication and different dialogue styles. We then give a brief information to the new 'JOB-BANK' system that we have designed at Concordia University.

The following sections explain the different classes of man-computer interfaces, the types of users, interface categories, dialogue design procedures, dialogue styles, and finally the scope of our proposed new system.

1.1 Classification of man-machine interfaces :

Martin [1973] has distinguished between two classes of man-computer interfaces. In the first class, the user is familiar with the system and operates it all day and every day. There is pressure put on him by the need for a rapid response, and there are technical constraints because of the computer hardware. The second class of interface is that of the casual user who rarely interacts with the system and who requires a great deal of help in performing the action he requires. A typical method used is to present the user with a simple response. A further set of choices or requests for data is then presented and so on until the objective is reached.

1.2 Types of users :

Stewart [1974] distinguishes between four types of users who have different requirements even when using the same computer system. These four types are :

- (a) Consumers and the public : These people must communicate with the system through other people (e.g. airline passengers).
- (b) Managers : These people solve problems and make decisions. They may need relevant, easy-to-use systems.
- (c) Clerks (e.g. secretaries) : These people have specific business information requirements such as handling the data for a computer system.
- (d) Specialists : These people interact directly with

the computer (e.g. engineers, designers, etc.) and may need specialized systems.

1.3 Interface Categories :

Three interface categories are described in Henry (1978) as outlined below :

- (a) Interactive End-User Interface : In this, the user issues 'query language commands' through a keyboard (CRT or hard copy) terminal to access the database.
- (b) Host Programming Language Interface : In this, a programming language such as FORTRAN, COBOL, PL1 is used to access the database.
- (c) Special Interface : These require special hardware such as graphic terminals for accessing the database.

Now after this explanation of the man-computer interface, let us assume that any man-machine interaction system is divided into two components as given in Henry (1978) :

- (1) The database component consists of the database and the database management system (DBMS), i.e. the stored data (schemata, subschemata) and the database operation. A DBMS is a computer system concerned with the representation, retrieval and use of information; for example, airline reservation systems, payroll systems, and inventory systems. By

DBMS the user does not need to specify where the data reside or how to create the database. The system provides the means for a user of computer information to select subsets of data in the database which are of interest to him, and then to display a report on the selected data in a specified format and sequence, all within the space of a single session at an on-line computer terminal.

- (2) The dialogue component manages the dialogue between user and application system (or conversation interface). Using the computer, the user's main interest interacts with the database component. The following section will explain in some detail the man-computer dialogue.

1.4 Man-computer dialogue :

According to Hebdith [1981], a dialogue is a set of procedures for the exchange of information, commands and responses between a computer-based system and its human user through the medium of an interactive device such as Visual Display Unit (VDU) or key-board/printer terminal. The dialogue serves as a problem-solving method where the dialogue-initiator (the user) knows the problem and the dialogue-responder (the system) is used to solve subproblems. A good dialogue should have most of the following characteristics :

- Easy to learn.
- Easy to use
- Easy to extend and modify
- Error avoiding as well as error detecting
- Economical
- Efficient
- Consistent
- Adaptive (learning)
- Helpful (teaching)
- Can be personalized

The dialogue design process can be broken down into six stages :

- (a) Identification of data elements : All elements which are likely to appear in a dialogue between user and system should be identified, their objectives stated and an attempt made to define their characteristics.
- (b) Selection of dialogue style : The second stage of the dialogue design process is choosing most appropriate style of dialogue. This is probably the most critical stage of the system design process. For example, in our new 'JOB-BANK' system we will use the menu-selection style combined with the displayed format style.
- (c) Breakdown of the dialogue into discrete blocks : A dialogue takes the form of alternate statements from the user and from the system. To start off the design process, the objective of each statement, made first by

computer and then by the user, should be identified.

(d) Dialogue design for each block : Each objective must be taken in turn and the dialogue designed for it in the selected style. The dialogue should meet the needs of the intermediate user as follows :

- For each objective the variations and limits of the dialogue should be identified.
- Each input by the user should result in a quick response from the system (e.g. if the user has requested a search of a database which is taking some time, the system should say it is searching).
- The vocabulary used in the dialogue should be easily understood both by the user and by the computer.

(e) Formatting the screen : There are some factors which contribute to a good format design of the screen. These are :

- The sequence in which information is presented should be logical in terms of the system itself.
- Spacing and blanks in a display are important both to maintain the logical sequencing and the structure of the dialogue.
- Where there are relationships between items of data and information, the display can be improved if relevant items are grouped together.
- Several simple displays should be provided rather than a complex one.

(f) Testing and modification : After the dialogue has been

designed it. should be tested by the users on the terminal equipment they will eventually be using.

1.5 Dialogue styles :

According to Damodaran, Simpson and Wilson (1980), there are eight main groups of dialogue styles :

(a) Natural language-based (Hebdith 1981) :

Natural language processing would be helpful for the large number of non-programmers who are using a computer in their work, if they could instruct the computer in English, or use English to explain what they want from the computer. The main technical steps in natural language processing are syntactic analysis, semantic analysis, and interpretation with respect to a world model. An example of a natural language-based dialogue as it appears on a Visual Display Unit (VDU) is given in figure 1-1.

(b) The programming style of dialogue (Damodaran, Simpson and Wilson 1980) :

The programming style of dialogue is rarely relevant for any user type other than programmers and even then this style should not be used without very careful consideration and user consultation. An example of this type of dialogue is shown in figure 1-2.

In the GUS (Genial Understander System) system the following dialogue is acceptable :

GUS: Hello. My name is GUS. I can help you plan a simple trip by air. Where do you want to go?

Client: I want to go to San Diego on May 28.

GUS: What time do you want to leave?

Client: I must be in San Diego before 10 am.

GUS: Would you like P.S.A. flight 102 that arrives at 9.15 AM?

Client: What is the next flight?

GUS: Air California flight 310 that leaves at 8.30 am and arrives at 10.00 am

Client: I'll take the first one.

GUS: In what name should I make the reservation?

Client: Dan Bobrow

GUS: I have confirmed the following flight:
P.S.A. flight 102 on Wednesday May 28 from San Jose to San Diego that leaves at 7.30 am and arrives at 9.15 am.
Thank you for calling. Goodbye.

Figure 1-1

A transcript of an actual dialogue with GUS.

(From DANIEL and RONALD (1977))

```
UPDATE PERSONAL RECORD
ACCEPT ACTION,
IF ACTION EQ 'D',
LIST PERSONAL RECORD,
REMOVE PREC
ELSE
IF ACTION EQ 'I'
INSERT PREC,
IF ACTION EQ 'R'
REPLACE PREC.
```

Figure (1-2)

Example of programming-style dialogue
(From DAMODARAN, SIMPSON and WILSON (1980))

The commands above were given the user

(c) Instruction and response dialogue (Damodaran, Simpson and Wilson 1980) :

The example of instruction and response dialogue in figure 1-3 shows how instruction and response can be used for infrequent users where the main task of the operator is to input data. Of course, this style of dialogue can also be used by experienced users, though in this case the prompts shown in figure 1-3 should be omitted or simplified.

(d) Menu-selection (Michael, 1982 and Balston, 1982) :

When visual display terminals became available on the market, the designers used the menu-selection technique in most applications. At each stage of this type of dialogue, a list of options (menu) is displayed on the screen. The user chooses one option and gets the next screen until the required display is found. The choice of option may be made by entering a code at the keyboard, moving the cursor round the screen, using a light pen. A good dialogue should permit the user to backtrack from one screen to the previous one to make a different choice; or he may be allowed to set up sequences of menus for particular actions. This technique is very suitable for inexperienced users. An example of a menu selection dialogue is shown in figure 1-4.

ENTER PERSONNAEL CODE OR 'END'

1297684

EVANS LESELY

ENTER SELECTION REQUIRED : 'PERSONAL'

'EDUCATION'

'EMPLOYMENT'

OR 'SALARY'

SALARY

ENTER ITEM REQUIRED : 'BASIC'

'GROSS-TO-DATE'

'TAX-TO-DATE'

OR 'OTHER'

BASIC

BASIC IS \$ 33,000 PER ANNUM

DOL YOU WISH TO CHANGE THIS ITEM ? ENTER 'YES' OR 'NO'

NO

ENTER PERSONNEL CODE OR 'END'

END

Note : User input is underlined.

Figure 1-3

An example of
instruction and response dialogue
(From DAMODARAN, SIMPSON and WILSON (1980))

WHAT DO YOU WANT ?

1. CHANGE INFORMATION IN YOUR CIRRCULUM VITAE ?

2. CLASSIFICATION OF JOBS?

PLEASE ENTER YOUR CHOICE : 2

Note : User input is underlined.

Figure 1-4

Example of a menu-selection dialogue

(From the new 'JOB-BANK' system we have propped

at Concordia University, Montreal)

But experienced users often find this mode of interaction with a system rather unsatisfactory, and a modified menu method with users typing a few of the first letters of chosen menu item without the menu itself being display can be a useful technique. The system can thus be menu-driven for beginners, but command-driven for experienced users such as SPF (Structured Programming Facility) that created by IBM Corporation (1979).

(e) Displayed format (Damodaran, Simpson and Wilson (1980)):

Displayed formats are probably the simplest of the dialogue styles on most terminals. In practice, the displayed format as shown in figure 1-5 could be omitted for experienced users who can remember the correct input order. The menu-selection technique as explained above could be employed to indicate the transaction required.

(f) Form-filling dialogue (Balston, 1982 and Henry, 1978).

The form-filling dialogue style involves displaying a format map on the screen which corresponds as closely as

possible in layout to the related input (see figure 1-6). The 'map' is protected and can not be accidentally altered, by the user from the keyboard. The user keys data into 'variable' areas of the screen which are not protected. The data which have been entered can then be transmitted to the computer by pressing the 'send' key. Such techniques are very easy to use. With fixed-length fields, the cursor is automatically tabled to the next input field when the last character is entered. With variable fields, the user presses the TAB key when he finishes the input. This dialogue style works very efficiently in the use of communication lines, because only the entered data need be transmitted to the computer. The user inputs only data and does not need to receive output.

(g) Panel modification (Damodaran, Simpson & Wilson (1980)):

The panel modification style is only recommended for experienced operators handling complex data. Data is displayed on the screen in response to an input key such as 'salary details' (see figure 1-7). If required, fields may be modified and sent back to the system by users who have security clearance for that particular field.

(h) Query by example (Damodaran, Simpson
and Wilson (1980)):

The query by example style is used when an enquiry or a search is made on a database. The computer will display on

request the column heading of a particular file or of a preselected report. Below this, the user specifies the logic of the request in the column displayed and selects the fields to be displayed (see figure 1-8). Because this style is used for the output of data, it is sometimes suitable for people like managers and process controllers.

BOOK ORDER

ENTER AUTHOR/TITLE/PUBLISHER/ISBN/

NO. OF COPIES/CUSTOMER NAME/CUSTOMER ADDRESS/

POST OR COLLECT ?

HATCH, GRAHAM/THEORY OF ECONOMIC GROWTH/

MACMILLAN/NOT KNOWN/18/RICHARD DAVIS/

354 HIGH RD, HARROW WEAL, HARROW,

MIDDLESEX/POST

Note :User input is underlined.

Figure 1-5

Display format style of dialogue

(From DAMODARAN, SIMPSON and WILSON.(1980))

NEW ACCOUNT DETAILS

ACCOUNT NUMBER (84978632) CUSTOMER ORDER REF (*))
CUSTOMER NAME (DAVE EVANS) TYPE (BUTCHRS)
ROAD (18A ST. ANN'S ROAD *)
TOWN/CITY (HARROW *)
COUNTRY (MIDDLE SEX *)
DELIVERY ADDRESS (AS ABOVE *)
DELIVERY INSTRUCTION (DELIVER TO REAR PREMISES *)

Note : User input is underlined.

- (= TAB STOP (The first entry position of the
variable field)
) = AUTOTAB (The last entry position of the
variable field)
* = DEPRESSION OF TAB KEY

Figure 1-6

Example of a Form-Filling Dialogue
(From DAMODARAN, SIMPSON and WILSON (1980))

NEXT FUNCTION TYPE

SALARY DETAILS

WADE, PAUL MAXWELL

FIGURES MARKED BY '*' MAY BE CHANGED BY THE OPERATOR

BASIC SALARY *47000 ANNUAL BONUS *2000

GROSS PAY TO DATE 22600 TAX TO DATE 8700

PENSION FUND CONTRIBUTION *02.50 %

TOTAL CONTRIBUTED TO DATE 579.00

PENSION AT RETIRMENT 10500 PA

NATIONAL INSURANCE RATE 2.45 *CONTRACTED OUT

DATE OF LAST INCREMENT 31.01.85

Note : User input is underlined.

Figure 1-7

A panel Modification Dialogue

(From DAMODARAN, SIMPSON and WILSON (1980))

Example of a search query :

DATA BASE : PERSONNEL			
ELEMENTS :			
NUMBER	NAME	DEPARTMENT	SALARY
*	*	<u>SALES</u>	<u>18000 - 22000</u>
NUMBER	NAME	DEPARTMENT	SALARY
47402	SUTHERLAND, MARK	SALES	18450.00
47863	WILSON, FRED	SALES	21500.00
END			

Note : User input is underlined.

* = The user does not need this field to be displayed.

Figure 1-8

Query by example dialogue

(From DAMODARAN, SIMPSON and WILSON (1980))

1.6 A brief description of a new system :

The problem of automating the existing system at the Canada Employment Office (Concordia University - SGW Campus) has arisen for two reasons. First, computer use has over time become much easier, and second computing resources have become more generally accessible.

The new system is a user friendly system using a man-computer dialogue technique; that is, an exchange of formal messages between a user and a computer system. This often takes place over a Visual Display equipped with a keyboard. From the dialogue styles described above, we chose a combination of two styles: the menu-selection and displayed-format to implement our new system. The benefit of offering menus as the interface to an application is that they provide a user with a visually displayed choice and a structured view of the application. The need to remember, or to rely on a manual, is not necessary when using menus. Since commands are displayed on menus, users do not have to remember the commands that perform specific applications. So the new system provides a good user interface that takes into account human patterns of learning, remembering, and forgetting.

The 'Job - Bank' system has been implemented on DEC VAX-11/750 at Concordia University and the programs are

written in FORTRAN. The internal organization of the new system can be divided in two parts : the first part is related to the student as user. It produces menus and submenus which help him in his search for a job from the available list of jobs at the employment office. It also stores or changes information in the student curriculum vitae, accesses a job description, or fills an application for the any available job. The second part of the system is used for the counsellor who interviews the student. The menus and submenus in this part help the counsellor to update the student information (student history) at the employment office and also update the job file.

The following chapters describe in the detail the existing manual system at Concordia University and our new system. Chapter 2 gives all the details of the existing system and a closer analysis of the structure of this system. The analysis will also bring some problems to light. Chapter 3 explains the design procedures of the new system, such as the development phase and solution phase. Chapter 3 also includes the design of the database and the screen formatting. Chapter 4 (the last chapter) gives the advantages of the new system and projected future requirements of the system.

Chapter 2

The Existing Job Placement System at Concordia University -----

The existing system at the Canada Employment Centre (Concordia University) is used to help the student in his efforts to select a job from the available jobs at the centre. The system has two parts: the first part is used by the student and the second part is used by the counsellor who interviews the student. This chapter describes the overall structure of the existing manual system at the Employment Centre (Concordia University) and attempts to identify the actual problems in the existing system.

2.1 Problem analysis :

According to Parkin (1981), the purpose of the problem analysis task is to establish a solid foundation for problem definition and system requirements by identifying present and future needs. This was done by interviewing some of the staff at the Employment Centre (Concordia University). These interviews are very important to the information gathering function, i.e. gathering data person-to-person through a questionnaire used by the interviewer. The author of this report was the interviewer. The problem analysis has three principal parts as outlined below :

(a) Documents collection :

During the interviews with the staff at the Employment Centre, we tried to study the documents used in the system. These documents carry useful information about the data elements and terminology such as who completes a document, how it is routed, and how it is filed. The following section will explain some of these documents which are used.

- (1) The first document is called the UCPA (University and College Placement Association) standard form. This form is completed by the student in three cases: first, if the student has not registered before at the Employment Office; secondly, if he wants to change any information in his record; thirdly, when the student finds an interesting job from the available jobs at the centre (see figure 2.1).
- (2) The second document is 'the job description card' that is used by the counsellor to declare any new job description (see figure 2.2).
- (3) The third document is an 'interview card' that is used by the secretary to arrange an interview between the counsellor and the student (see figure 2.3).
- (4) The fourth document is a 'job request form' that is used by the student.

APPROVED BY UCPA AND CEIC 		APPLICATION FOR EMPLOYMENT <small>© 1981 University and College Placement Association</small>				<input type="checkbox"/> PERMANENT <input type="checkbox"/> SUMMER <input type="checkbox"/> CO-OP <input type="checkbox"/> PART-TIME		
(Cette formule est également disponible en français)								
APPLICATION TO (Name of firm)		NAME OF EDUCATIONAL INSTITUTION			POSITION SOUGHT			
GENERAL INFORMATION								
FAMILY NAME (capital letters)				GIVEN NAME(S)				
PRESENT ADDRESS								
No.	Street		City	Prov.	Postal Code			
					Tel.: ()			
PERMANENT ADDRESS IN CANADA IF DIFFERENT FROM ABOVE								
No.	Street		City	Prov.	Postal Code			
					Tel.: ()			
DRIVER'S LICENSE		DO YOU SPEAK FRENCH?			DO YOU WRITE FRENCH?			
<input type="checkbox"/> yes <input type="checkbox"/> no		<input type="checkbox"/> no <input type="checkbox"/> well <input type="checkbox"/> a little <input type="checkbox"/> fluently			<input type="checkbox"/> no <input type="checkbox"/> well <input type="checkbox"/> a little <input type="checkbox"/> fluently			
SPECIFY CLASS: _____		OTHER LANGUAGES? ►						
ARE YOU LEGALLY ELIGIBLE TO ACCEPT EMPLOYMENT IN CANADA?								
DOCUMENTARY EVIDENCE OF ELIGIBILITY MAY BE REQUESTED AFTER A JOB OFFER IS MADE.					<input type="checkbox"/> yes <input type="checkbox"/> no			
EDUCATION								
ENTER NAME(S) OF POST SECONDARY AND SECONDARY INSTITUTIONS ATTENDED BEGIN WITH MOST RECENT INSTITUTION ATTENDED	FACULTY, DEPARTMENT, DIVISION OR SCHOOL	DISCIPLINE OR PROGRAMME (MAJOR)	DATES ATTENDED				DEGREE/ DIPLOMA	DATE OBTAINED OR EXPECTED
			FROM	TO	Month	Year		

Figure 2-1
 The UCPA form
 (University and College Placement Association)



Employment and
Immigration Canada

Emploi et
Immigration Canada

No

Title
Titre

Salary
Traitement

Location
Endroit

Terms
Termes

Requirements
Exigences

Details
Détails

EMP. 2089 (11-73) (MAN. 1177)

Figure 2.2

The job description card form

Feuille d'inscription
Registration Form

Name
Nom _____

Faculty/Major
Faculté/Disp. _____

Yr./Mth./Grad.
An./Mois/Grad. _____

Statistics / Statistiques

Interview
Entrevue 1 _____
11 _____
CIE _____
Other / Autre _____
Details/Details _____

Figure 2.3
The interview card form

The student gives that form to the secretary, who gives him an interview with the counsellor (see figure 2.4).

(5) The fifth document is a 'student application for a summer job' that is used by the student applying for a summer job (see figure 2.5).

(6) The last document is a 'Referral notice' that is used by the counsellor. This form has the history of student-counsellor interview as recorded in the Employment Centre (see figure 2.6).

(b) Getting the 'Overall Picture' :

We obtained an overall picture of the existing manual system by discussing the organization chart (see figure 2.7) with the manager of the Employment Centre to determine from him the level of communication within his department and the department's relationship with the user. The organization chart of work in figure 2.7 identifies everyone who has a stake in the manual system (i.e. all those who will be affected directly). The system has two major parts :

(1) Manager part : This part is divided into two levels as follows:

JOB REQUEST FORM
BORDEREAU DE DEMANDE D'EMPLOI

JOB NUMBER _____
NO. DE L'EMPLOI

JOB TITLE _____
TITRE DE L'EMPLOI

YOUR NAME _____
VOTRE NOM

FACULTY _____
FACULTE

Figure 2.4
The job request form

REFERRALS

A close-up of a single handwritten letter 'I' on lined paper. The letter is formed with a thick black marker, showing a vertical stem and a horizontal top bar. The paper has horizontal blue lines.

The referral notice form

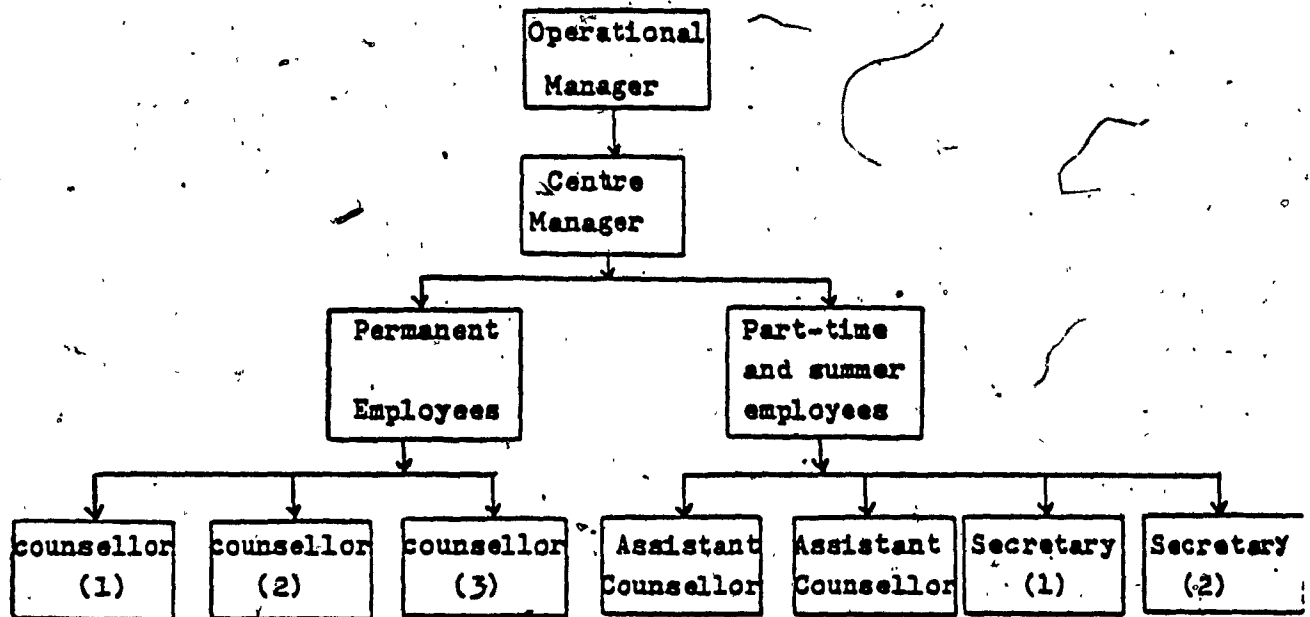


Figure 2-7

Organization chart at the Canada Employment

Office (Concordia University)

(i) Operational manager: The operational manager has control and is responsible for strategy and planning in all the university Employment Centres in Montreal. Every month each Employment Centre in each university sends the statistical reports to the operational manager. These reports contain all the information about the student's registration, student's cancellation, and types and numbers of jobs.

(ii) Centre manager : Each Employment Centre at each university has a manager. This manager has certain responsibilities. Every month he collect statistical reports from the counsellors and prepares a final report for the operational manager. Also, the office manager is responsible for translating operational manager decisions into action, and for helping to define plans.

(2) Employees part : This part is divided into two parts :

(i) Permanent employees(The counsellors) : There are three permanent counsellors. They interview the students, update the description, and update the student history information in the Employment Centre.

(ii) Part-time and summer employees : This section has four persons, two of them working as counsellor assistants, and the other two working as general

clerks such as secretaries. These secretaries arrange the appointments for the student with the counsellor and do typing, filing, and dictation.

(c). Analyzing the service request :

Service request analysis begins by identifying the user, and all the problems in the existing system. First, the user in the existing system is any regular student at Concordia University. If the student is not a Canadian Citizen or landed immigrant, he must have permission to work in Canada.

We can now give more specific details about the existing system by drawing a work flowchart (see figures 2.8 & 2.9). Then, by studying the work flowchart, we can begin to identify the problem areas. The following section will explain the problem areas in the existing manual system at the Employment Centre (Concordia University).

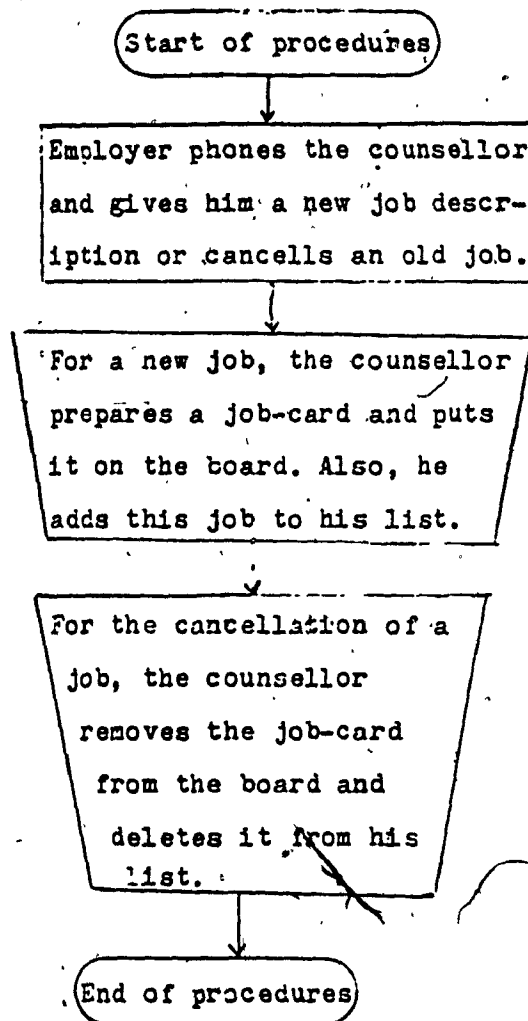


Figure 2-8
Employer and counsellor procedures

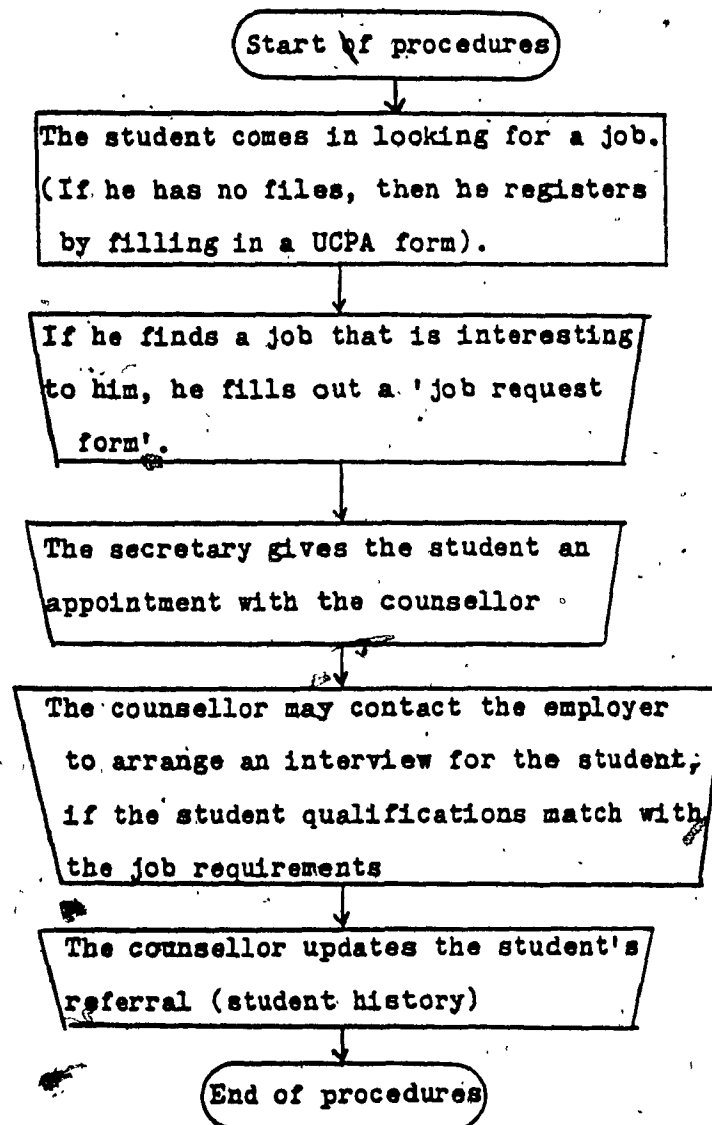


Figure 2-9
Counsellor and the student procedures

2.2 Problems areas:

There are three major problem areas in the current system:

- (a) Problems in the registration of students at the Employment Centre.
- (b) Updating of jobs.
- (c) History of student-counsellor interviews (also called student referrals).

These are explained in detail below :-

- (a) Problems in the registration of students at the Employment Centre:

If the student has no file at the Employment Centre, then he must register by filling out the UCPA form shown in figure 2.1. It contains all the student data such as general information (i.e. name, the address, telephone number, etc.), work experience, educational level, etc. (see figure 2.1). Without such registration, the student has no right to an interview with the counsellor. But if the student was registered before and he is interested in any job on the board, then he completes either the UCPA form or the Job-Request form. If the student used the UCPA form, then the secretary takes this form and sends it directly to the employer without an interview with the counsellor. If the student used the 'Job-Request'

form, then the secretary must arrange an interview between the counsellor and the student. During the interview, the counsellor discusses the student's qualifications and if there is a match between the job requirements and the student's qualifications, the counsellor contacts the employer to arrange an interview with the student. In some cases the counsellor gives the employer's address to the student and the student sends his request himself.

From the above discussion we can see these problems :
The only way for the student to change any information in his record is by filling out a new UCPA form. So, the student loses time by rewriting a new form. Moreover he may make some mistakes which were not in his record before. Also the counsellor loses time by rearranging the student's file. Sometimes the old record of the student before the updating is not destroyed and that means there is more than one record for the same student. This can cause confusion. Besides that, the registration forms cost money.

(b) Updating of jobs:

First, the employer phones the counsellor and gives him the new job information. If the employer wants to cancel his order for a job, then the counsellor deletes the job from his job-list, and at the same time he must remove the job card from the board. If the job is new, then the counsellor adds this job to his job-list and prepares a new

'Job-Description Card'. After that the counsellor put the job card on the bulletin board.

The problems here are related to the counsellor. If he forgets to remove a job from his job-list and from the board at the same time, then a student may see the job on the board and request it. Besides that, the counsellor may make a mistake and give a student a job address when this job was cancelled by the employer. Also the printing of job-cards and the counsellor's job-list cost money.

(c) History of student-counsellor interviews

(student referrals):

During the interview between the counsellor and student, the counsellor creates a new referral (see figure 2.6) for each interview. Each referral has the job description, interview date, result of meeting between the student and the employer, etc. This means that each referral is filled in two stages; the first stage is filled directly during the interview (see figure 2.6 part 'I'). The counsellor gets the necessary information to fill the second part of the student's referral by telephone from the employer, after the employer meets the student (see figure 2.6 part 'II'). For each student, the counsellor has a number of referrals equal to the number of interviews with the student. These referrals are destroyed only if the student registration was deleted from the Employment

Centre. Filling these referrals takes a lot of time for the counsellor. Moreover, the referrals cost money to print.

In conclusion, the discussion above in, gives us an overview about the three major problems in the Employment Centre which are related to the student and the counsellor. For the student, we see the only way to change any information in his record is by filling out a new UCPA form (see figure 2.1). So the student loses time by rewriting a new form and he can make some mistakes which were not in his record earlier. For the counsellor, he has two big problems for the job-list updating and also for updating the student's referral during the student-counsellor interviews (i.e. the student history at the Employment Centre). Moreover, the printing of all the documents which are used by the student or by the counsellor cost money.

Chapter 3

Description of the New 'Job-Bank' System

Primarily the new 'JOB-BANK' system at the Employment Centre at Concordia University is an information retrieval system with the capability to let the user search a database to gather selected information via the CRT display communication terminal.

The new system was designed to create and verify at any given time the status of the student data (e.g. student referrals or student Curriculum Vitae) or the information on each available job at the Employment Centre. The system provides menus for a user (either the student or the counsellor who interviews the student) of computer information to select subsets of data in the database which are of interest to him, and then to display a report on the selected data in a specified format and sequence, all within the space of one session at an on-line computer terminal. The new system has been implemented on a VAX-11/750 and the programs are written in FORTRAN. The internal organization of the 'JOB-BANK' system is divided in two parts:

(a) The first part is used by the student who can access and display the following information on the CRT :

(1) Job classification (e.g. jobs in computer science, teaching, or medicine, etc.). This

classification is a copy from the Canadian classification and dictionary of occupations (1971) which was published by Authority of the Minister of Man-power and Immigration.

- (2) Information on each available job (e.g. job title, salary, and all the requirements of this job, etc.).
 - (3) The 'Job-Request Form' for a specific job.
 - (4) The student's Curriculum Vitae, which was stored in the system when the student came in the Employment Centre for the first time.
 - (5) Any change in information in the student's Curriculum Vitae.
- (b) The second part is used by the counsellor who interviews the student. The counsellor can access and display on the CRT the following information:
- (1) The student's data such as student-counsellor interviews at the Employment Centre.
 - (2) The file indicates list of available jobs. He can do any necessary updating.
 - (3) The student's referrals, with any updated information.
 - (4) Any student information, such as the student's Curriculum Vitae.

The above information can be accessed by the student or by the counsellor on the CRT using common login

procedures, entering a Student Identification number and student Social Insurance Number. By using both of these keys, there is more security and less risk of accessing the wrong record.

3.1 Description of user interface :

The new system has two user-interfaces:

(a) Control Language (FORTRAN Language):

FORTRAN is a high-level language used for performing system function and application control. It supports full screen input and output to the CRT. The FORTRAN language allows the user to describe each file, each record in a file, each field in the record, and the order of the fields. Also it is used to create physical files which contain data, display format (display files), and printer output format (printer files).

(b) Interaction display :

The interactive display interface provides a set of displays that permit the user to request functions and information to meet his/her needs. The displays are

designed to be easy to learn and to use. Each display is clearly titled on-line one to identify its purpose and to confirm that the desired display was received. If the display requires user action, such as selecting an option or entering values to define a request, this is communicated by instructional text at the bottom of the screen. The body of the display is the main purpose of the display, which may be a menu of choices, a series of input prompts, or output information. Messages are always displayed at the bottom. Our new system has three display types:

- (1) A menu allows the user to select a function from multiple alternative. Examples of menu formats are shown in Figure 3.1.
- (2) A prompt requests one or more values to be entered in a simple fill-in-the-blank format with each input field preceded by text describing the value to be entered (see Figure 3.2).
- (3) The final type is labeled-values-presentation display. It is very similar to a prompt display in that each value shown is preceded by text describing it. All values in this display are output only (see Figure 3.3).

What do you want?

1. Change any information in your record
2. Classification of jobs
99. Return to first menu

Please enter your choice :

Figure 3.1.

Example of menu displays

Work experience (begin with the most recent work):

Name of organization :

Address of organization :

Telephone number of organization :

Work period (month and year) From to

Name of supervisor :

Job title :

Duties : (I)

(II)

(III)

Figure 3.2

Example of prompt displays

Job Description

Occupational code : 2111-231 7
Job title : Programmer-analyst
Salary : \$25000
Job location : Montreal
Requirements : (I) Bachelor of computer science
(II) 5 years experience as a
programmer/analyst
(III) 2 years experience with DBMS.

Figure 3.3

Example of labeled value display

3.2 The database definition in the new system:

The following section will explain each file in the proposed system, each record in a file, each field in a record, and the order of the fields. The database of the new system at the Employment Centre at Concordia University has the following three parts:

- (a) Data about student registration (i.e. the Curriculum Vitae). This data is entered and updated by the student.
- (b) Data about the available jobs. This data is entered and updated by the counsellor.
- (c) Data about the student's interview history during his registration at the Employment Centre. This data is also entered and updated by the counsellor.

All the above information is stored in three master files and is manipulated by the 11 programs to provide information as needed. The student part uses 6 programs to respond to the student's request as follows:

- (1) The first program initiates the system with the student and helps the student go forward with the system by calling other programs.
- (2) The second program gives the student general information about the system such as the purposes of creating the new system.
- (3) The third program runs if the student was registered

before at the Employment Centre and helps him display the available jobs.

- (4) The fourth program runs if the student wants to change any information in his Curriculum Vitae and updates his record at the same time.
- (5) The fifth program runs if the student has not registered before at the Employment Centre and creates a new record for him at the same time.
- (6) The sixth program runs if the student finds any job interesting to him and wants to print a 'job-request form'.

The counsellor part responding to counsellor requests uses 3 programs as follows:

- (1) The first program initiates the system and helps the counsellor go through the menus and submenus of the system.
- (2) The second and third programs help the counsellor update the job master file (i.e. delete, modify, or add a job).

Besides these 9 programs, there are 2 other programs used by the student or by the counsellor. The first one prints a report for any job-data, and the second prints a report for the student Curriculum Vitae (i.e. student record).

In addition to these 11 programs, there are also 3

programs which are used to create the data-files. One program creates the student-record, a second one creates the job-file, and the last one creates record of the student-counsellor interviews (i.e. student history).

3.2.1 File organization:

As described above, the new system has three data files. Now, we will explain these files in detail:

(a) Student file : This file was created as indexed sequential file. The file is indexed by the student's Social Insurance Number as the elementary key and the student's identification number as the secondary key. A record in the student file (see figure 3.4) contains 2046 characters and has five types of information as follows:

- (1) General information about the student (e.g. student name, address, telephone number, etc.). This part has 177 characters.
- (2) Educational information which may be repeated up to three times. Every part of it has 135 characters.
- (3) Work experience which may be repeated up to three times. Every part has 371 characters.
- (4) Special skills. This section has 184 characters.
- (5) Type of work desired. This section has 164 characters.

Beside in the student file contains all the information

for all currently enrolled students at the Employment Centre. Depending on the student's educational level and work experience, the length of record will vary from student to another. All the new transactions for the student are updated directly while the student access his file. Figure 3.4 shows a record in the student file.

(b) Jobs-file : This file was created as an indexed sequential file. The file is indexed by the 'job-code' as the elementary key. A record in the jobs-file contains 260 characters. The record contains all the necessary information about the available jobs at the Employment Centre at Concordia University. All the new transactions for each job are updated directly during the treatment by the counsellor. Figure 3.5 shows a record in the job-file.

Item	Occurence	Picture
(I) General information:		
=====		
Social Insurance Number (key 0)		A(11)
Student Number		A(7)
Family name		A(20)
First name		A(20)
Address		A(70)
Telephone number		A(7)
Speak French		N(1)
Write French		N(1)
Other language	1	A(30)
Date of birth		A(10)
(II) Educational level:		
=====		
Name of institution		A(40)
Major		A(40)
Dates attended (from to)	0-3	A(14)
Degree/Diploma		A(40)
Grade average		A(1)
(III) Work experience:		
=====		
Organization name		A(40)
Organization address		A(70)
Telephone number of organization		A(7)
Work period (from to)	0-3	A(14)
Supervisor's name		A(20)
Job title		A(40)
Duties of job		A(180)

Note: A is alphanumeric
 ---- N is numeric

Figure 3.4
 A record in the student file

Item Picture	Occurence	
(IV) Special skills: =====		
Driver's licence		N(1)
Short hand		N(1)
Typing	1	N(1)
Business machine		N(1)
Special skills	0-3	A(60)
(V) Worke desired: =====		
First work desired		A(30)
Second work desired		A(30)
Available to start work	1	A(7)
First preferred location		A(30)
Second preferred location		A(30)

Figure 3.4 (continued)

Student file

Item	Occurrence	Picture
Occupational code (elementary key)		A(9)
Job number		A(4)
Job title	1	A(50)
Salary		A(7)
Job location		A(40)
Job requirements	3	A(50)

Figure 3.5

A record in a jobs-file

(c) Student' referrals file (counsellor file):

This file was also created as an indexed sequential file. The file is indexed by the student's Identification Number as the elementary key. This file is used only by the counsellor to see and update the student's history (student referrals) at the Employment Centre. All the new transactions for each referral are updated directly during the counsellor treatments with that file. Figure 3.6 shows a record in the student history file.

Item	Occurence	Picture
Student identification (key 0)	1	A(9)
Date of interview		A(12)
Employer name		A(40)
Job Title	0-3	A(30)
First Comment		A(55)
Second comment		A(55)
Counsellor's name		A(40)

Figure 3.6
Student history file

3.2.2 Description of Output/Reports:

The reports contain only those data values which are copies of values already stored in the master files.

The new proposed system at the Employment Centre at Concordia University provides some reports about the student data, job description, and student referrals (student history):

- (a) Student data (Curriculum Vitae) : A history of the items of student data as developed by the student himself. This report is only printed by the counsellor. Figure 3.7 gives a sample from this report.
- (b) Job requesting report : This report contains the job description with some information about the student such as his name, his telephone number, etc. (see Figure 3.8). This report is printed usually by the student.
- (c) Job description report : A description of any available job at the Employment Centre, as developed by the counsellor. (See Figure 3.9 for a sample of this report). This report can be printed by the student or by the counsellor.

Canada Employment Office
at Concordia University

NEW REGISTRATION

(I) General Information :

Social Insurance Number	:	123456789
Student number	:	1115308
Family name	:	Robert
First name	:	Smith
Address	:	44 Jackson Avenue Montreal, H3L 2E2.
Tel. number	:	3664455
Do you speak French	:	No
Do you write French	:	No
Other languages	:	English
Date of birth (Day/Month/Year)	:	14/12/1950

Figure 3.7

A sample report from the student
Curriculum Vitae

JOB REQUEST FORM

=====

Occupational code : 2100-00
Job number : 3
Job title : Programmer
Salary : \$ 23,000
Job location : Montreal
Requirements : (I) 5 years experience
(II)
(III)

=====

Application to (Name of firm) : Bell Canada
Your family name : Robert
Your major : Computer Science
Type of work :
(Full time=1, Part-time=2, Summer=3): 1

Figure 3.8

Job requesting report

JOB DESCRIPTION

Occupational code : 116-158
Job number : 2
Job title : Health inspector
Salary : \$ 428.50/week
Job location : Winnipeg
Requirements : (I) Ready to move
(II)
(III)

Figure 3.9

Job description report

3.3 General system flowchart:

This section explains the general system flowchart (see Figure 3.10) of the new proposed system. The flowchart has four major components as follows:

(1) System initialization:

To initiate the system, we used sample data from the old data which was stored in the Employment Centre. There are three types of data. The first is data created by the student when he registered for the first time at the Employment Centre. The second and the third types of data are created by the counsellor, such as the 'job-description card' and the 'student-counsellor interviews history at the Employment Centre (i.e. student referrals). Figures 3.11, 3.12 and 3.13 show how the new system was initialized.

(2) Inquiry subsystem for the student part:

This inquiry subsystem (see Figure 3.14) provides the student with feedback (Appendix 'A' shows all the displays of a typical example for the student part).

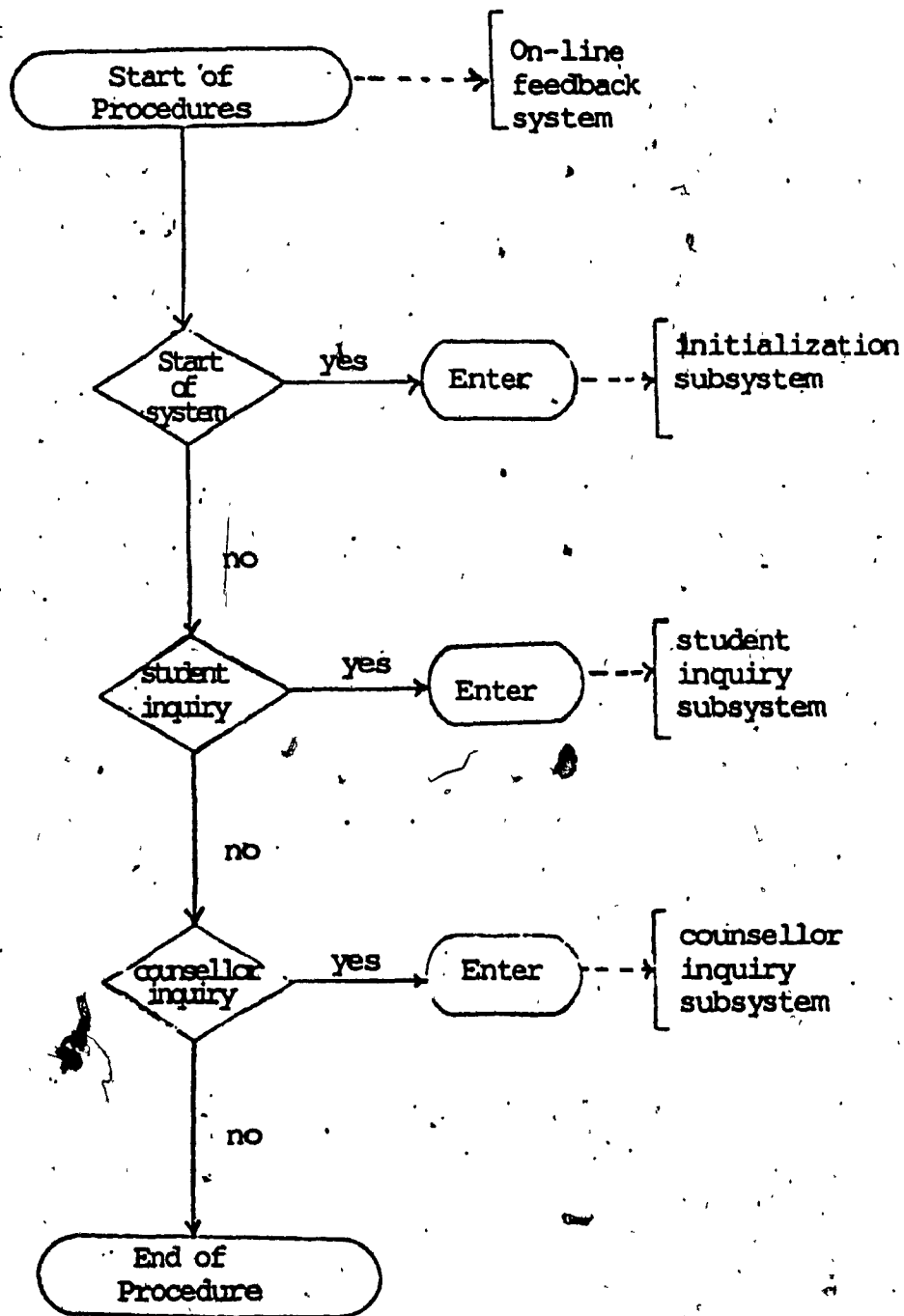


Figure 3-10
The general flowchart of the new system

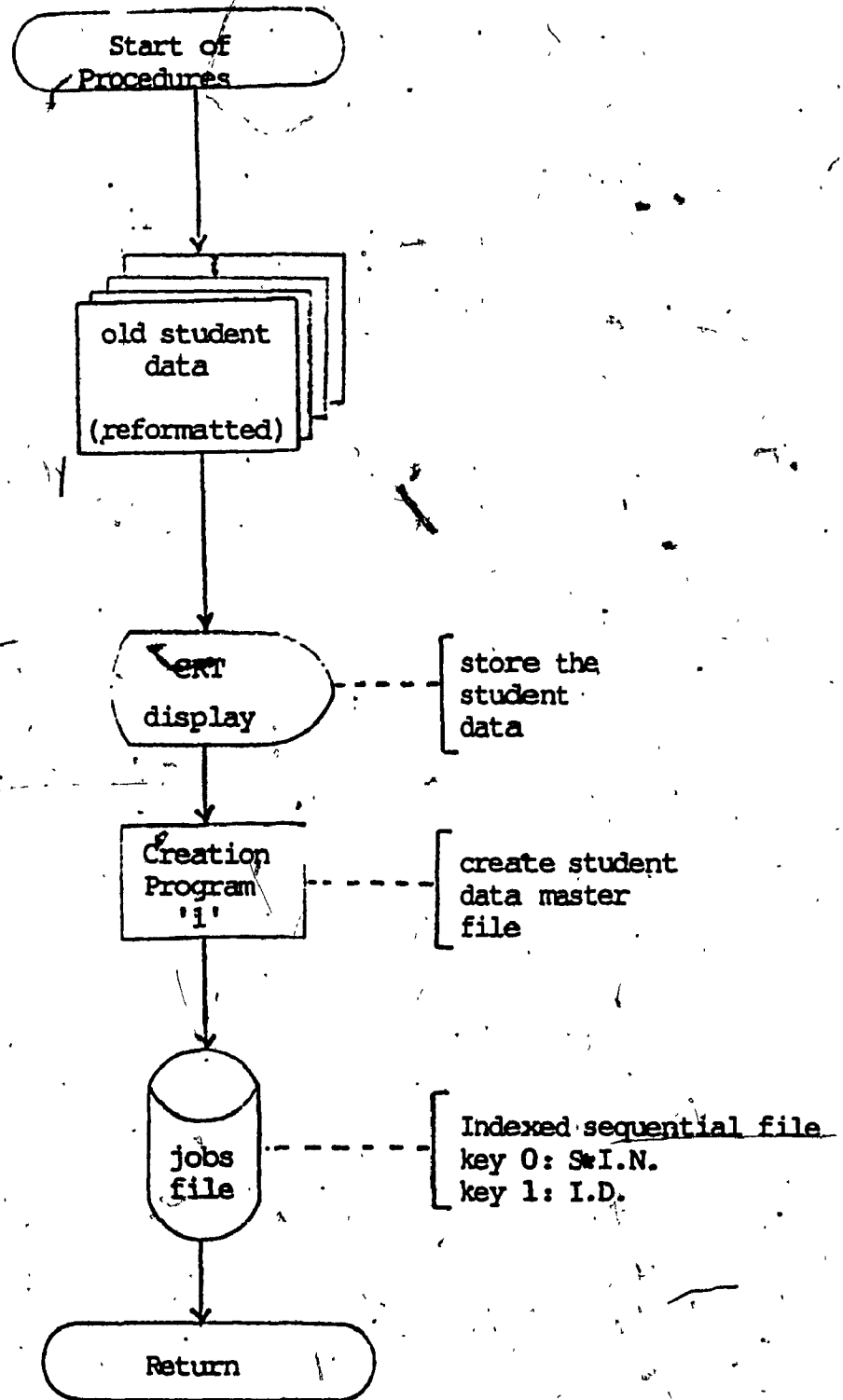


Figure 3-11
System initialization for the data in student file

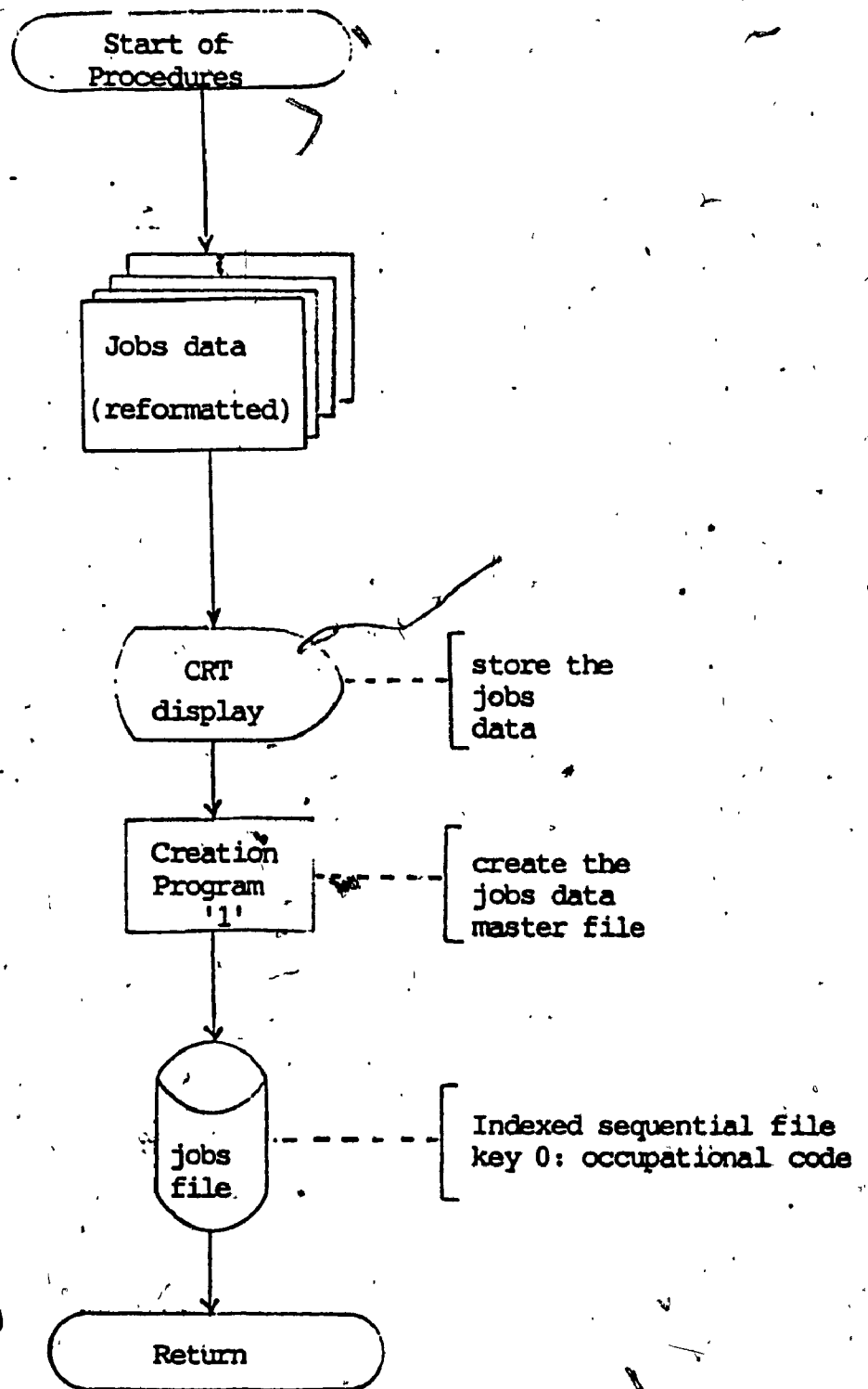


Figure 3-12
System initialization for the data in the job file

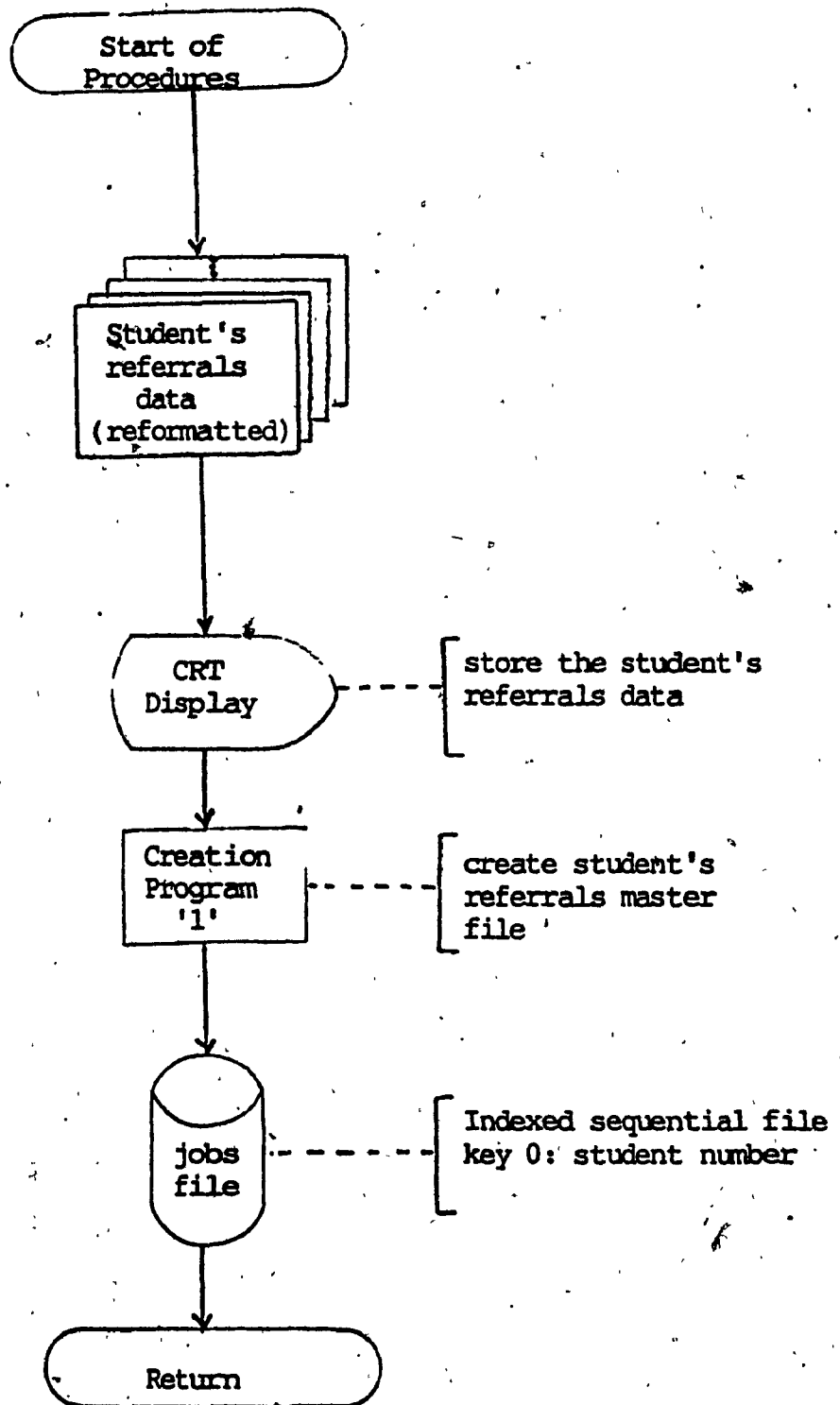


Figure 3-13
System initialization for the data in student's referrals

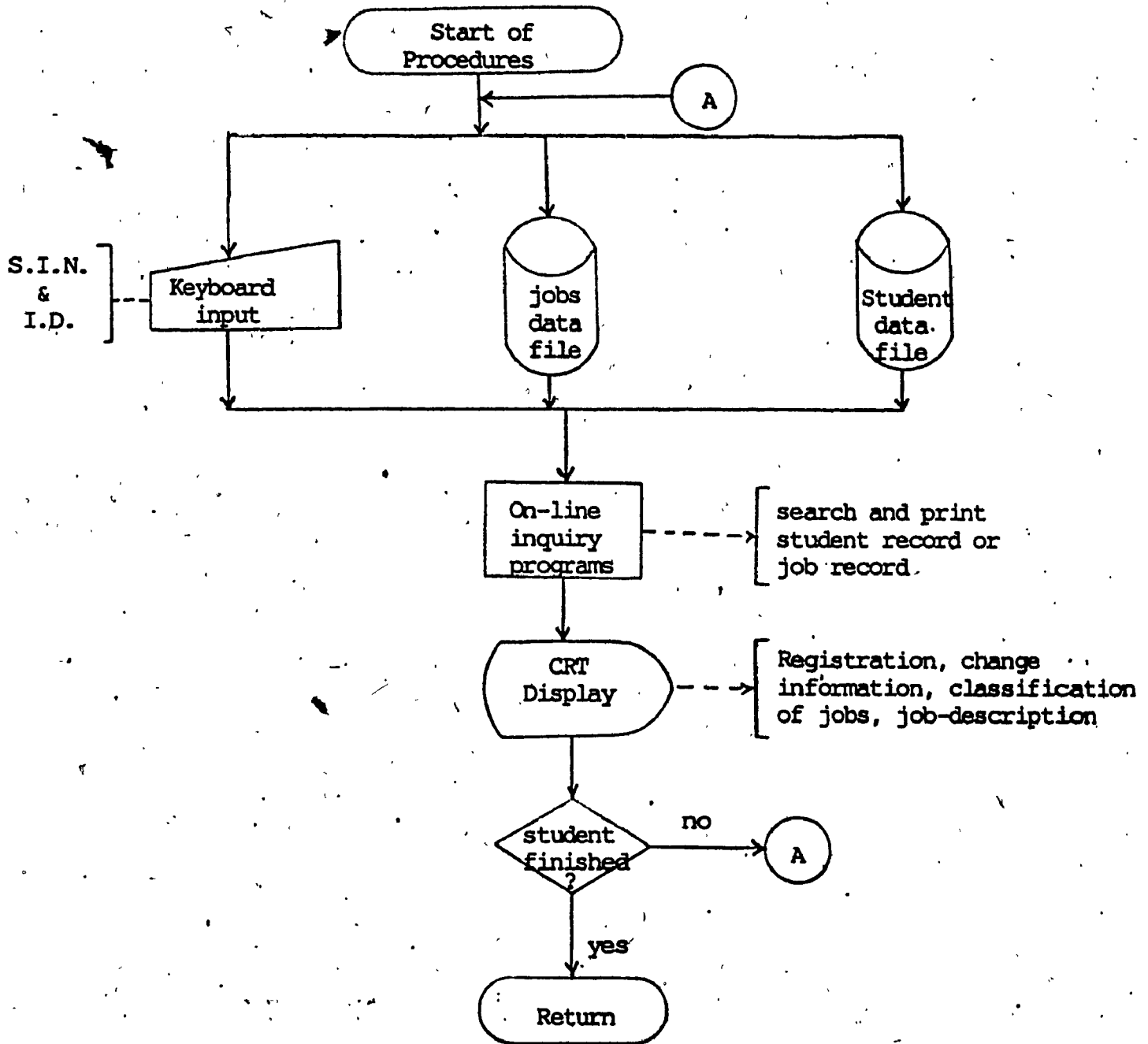


Figure 3-14
Inquiry subsystem available to a student

The first screen in this inquiry asks the student whether he has already stored his curriculum Vitae. If the student was registered before at the Employment Centre, then he must key in his Social Insurance Number (S.I.N.) and his Identification number (I.D.) correctly. If the S.I.N. and I.D. do not match student, then the system will give an error message and give the student another chance to enter his data again. If the S.I.N. and I.D. correspond to the S.I.N. and I.D. of the record being accessed, the system displays the student part of the master menu. Depending on the student's choice, the system goes forward by displaying another menu or submenu until the student meets his needs.

3. Inquiry subsystem for the counsellor part:

This inquiry subsystem (see Figure 3.15) provides the counsellor with feedback (Appendix 'B' shows all the displays of a typical example for the counsellor inquiry). The first screen in this inquiry asks the counsellor to enter the student's Identification Number (I.D.). The counsellor must key in the student I.D. correctly or the system will give an error message, telling the counsellor that he has tried to access a wrong record. If the counsellor's entry corresponds to the I.D. being accessed, the program will display the counsellor's part of the master menu. After that, depending on the

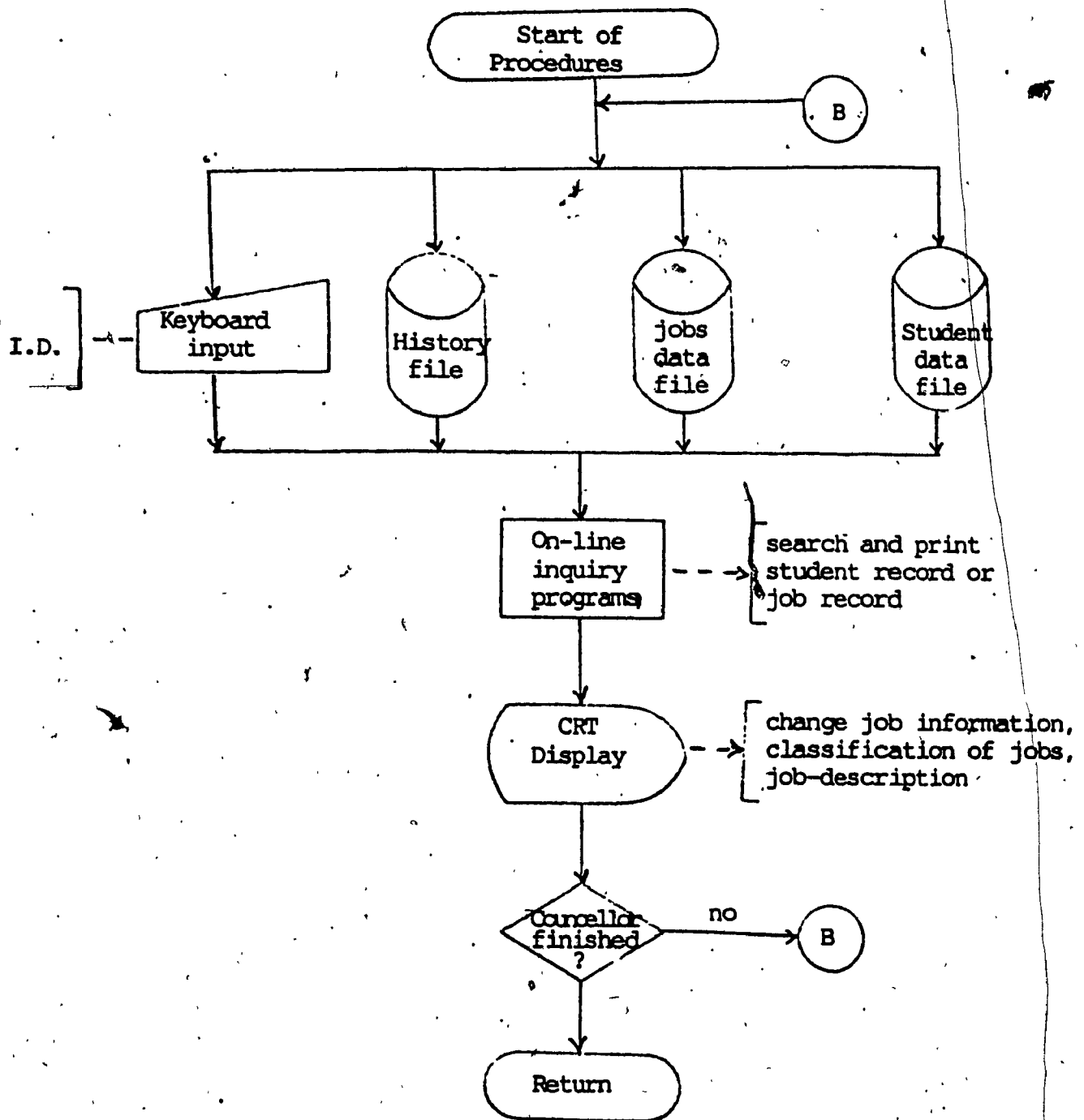


Figure 3-15
Inquiry subsystem for the counsellor part.

counsellor's choice, the system will go forward until the counsellor meets his needs.

3.4 Menu display function:

Now we start to explain the screen formatting (screen layout) which is used by the student or by the counsellor. As we described before in chapter 1, from the dialogue styles we used the menu-selection and display-format techniques to develop our new system. The user interacts with the menu by choosing from the items. This choice produces an action, such as the display of information, display of another menu, etc. The dialogue can be seen as a tree which forks at the YES/NO points and which has multiple branches whose menus which lead to alternative continuations. The dialogue trees for the student and the counsellor are shown in Figures 3.16 and 3.17 respectively.

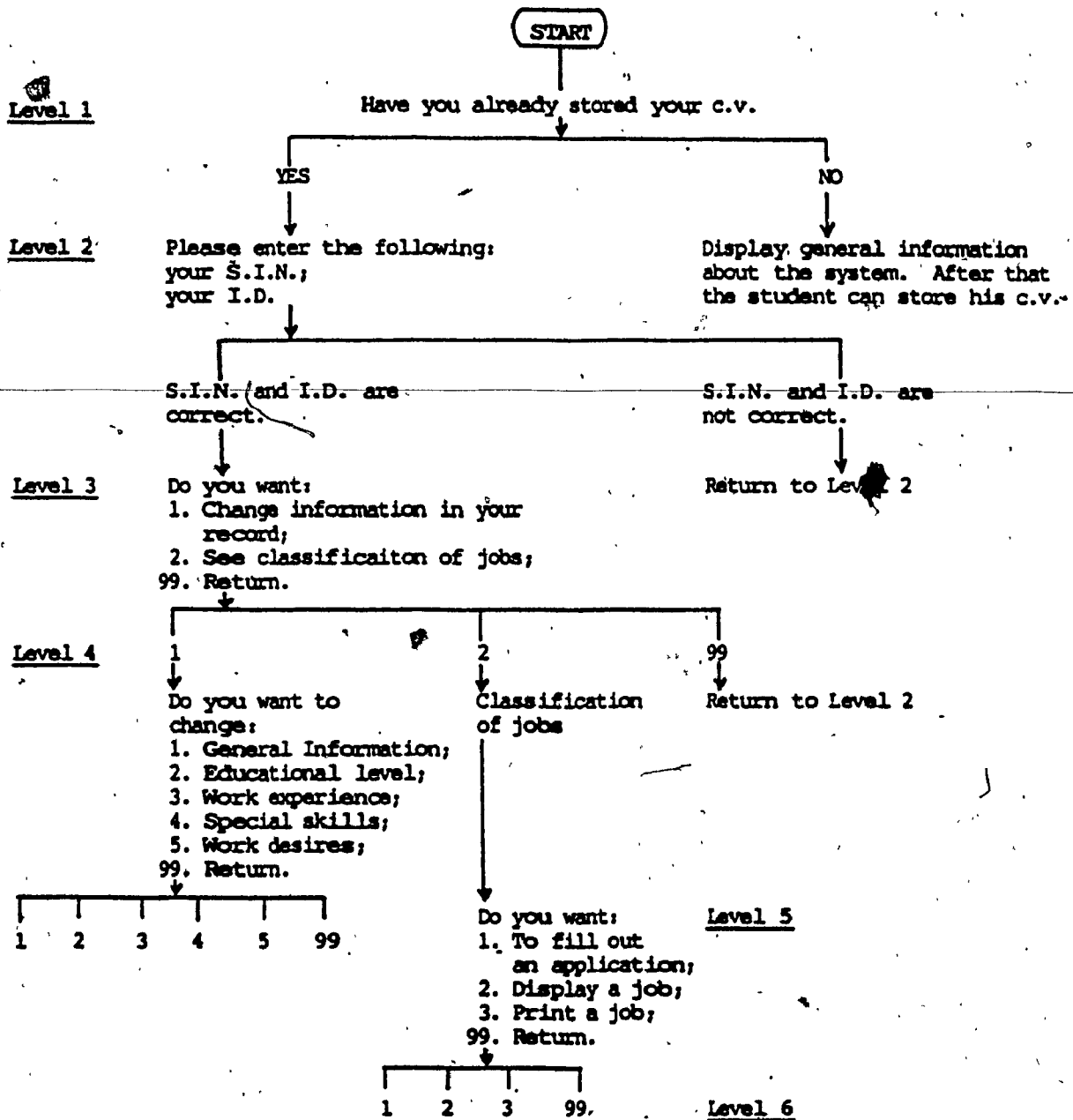


Figure 3.16

The dialogue tree for the student part

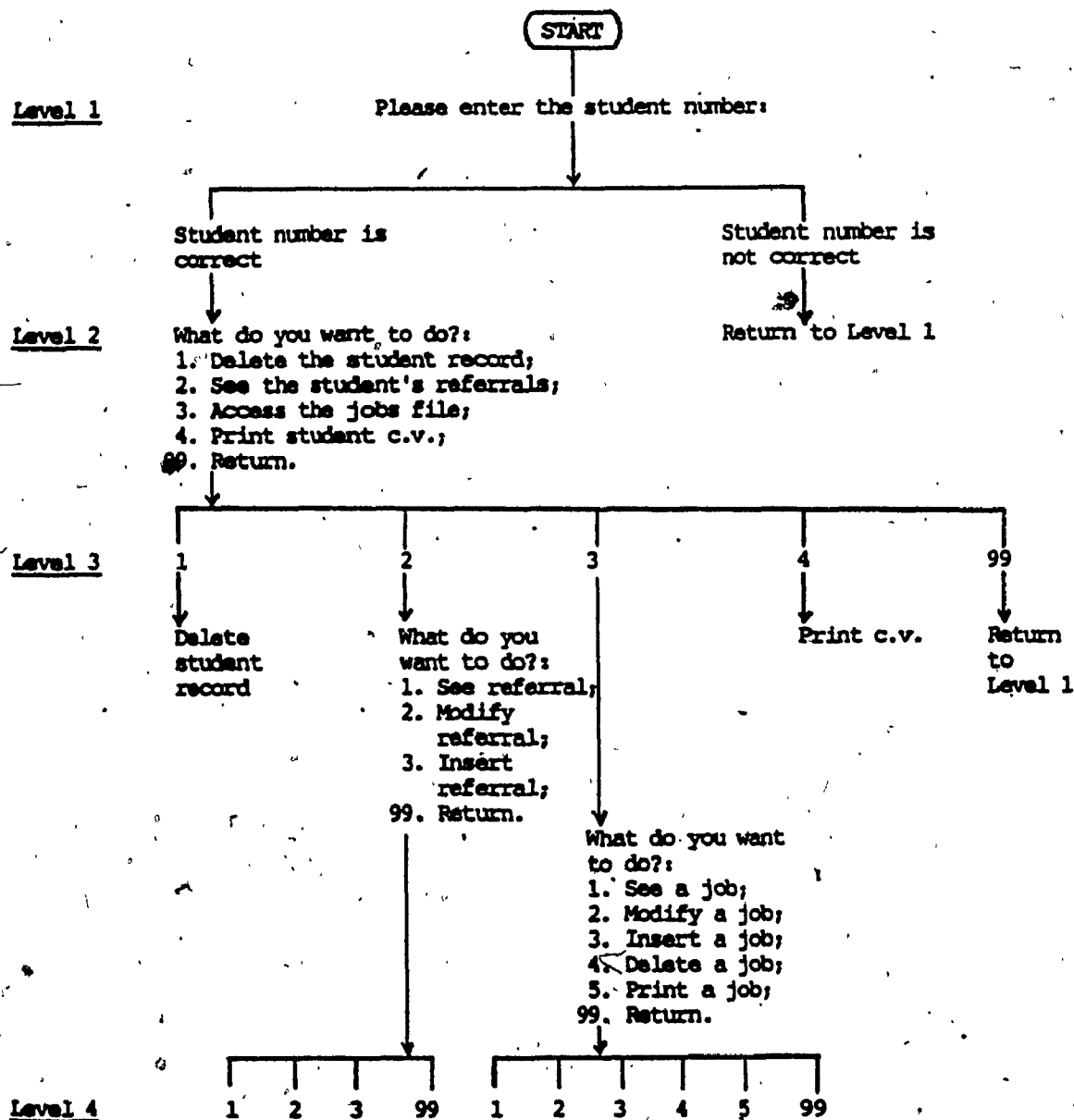


Figure 3.17

The dialogue tree for the counsellor part

Chapter 4

Conclusion and future developments

The 'JOB-BANK' is an interactive system developed for the Employment Centre at Concordia University. This project finds practical ways of responding rapidly to its users, both the students and the counsellor. In other words, the results of the new system should be more efficient service for the student and more satisfied staff at the Employment Centre at Concordia University. That means, it increases the productivity of the staff also. It can save and reduce overhead such as clerical staff and office costs.

The results reported in the last three chapters indicate that this is a satisfactory structure for the structure for the 'JOB-BANK' system. It is designed to help the student hunt a job from the job announcements available at the Employment Centre at Concordia University. The system also helps the counsellor who interviews the student, to handle the student's information in efficient operations with a minimum number of errors.

The new system was designed to create and verify at any given time the status of student data or the information on each available job at the Employment Centre at Concordia

University.

The system provides menus for a user to select subsets of data which are of interest to him.

The internal organization of the 'JOB-BANK' system is divided into two parts:

The first part is used by the student who can access and display the following information on the CRT :

1. Job classification
2. Information on each available job.
3. The student's C.V., to make changes or update information.
4. The ' Job-Request Form ' for a specific job.

The second part is used by the counsellor who can access and display the following information on the CRT :

1. The student-counsellor interviews, to do any necessary updating.
2. The Job-File, to do any necessary updating.

4.1 Expected benefits :

The expectation of user (i.e. a student or the Employment Centre staff at Concordia University) from the

new system are many and various. The users do not want a long delay between recognizing an information need and being able to meet it. This applies at two levels. They want easy access to a terminal and a fast response from the computer when they reach the terminal. At another level, the centre manager wants a system to help him improve his centre results, and he wants it working with a minimum of delay. Through the new system, the employees expect to find their way easily to the particular information they need and to have it presented to them in a way that will be easy for them to use.

Above all, our new system gives the workers 'good information'. 'Good information' means the precise information they need, accurate, up-to-date, consistent, and available at the time and in the place it is needed. This is done by using a number of inquiries on the CRT.

The proposed new system has some advantages and disadvantages. First the advantages of the new system are as described below:

- (1) Data entry will be more up to date than under the present system. The persons, such as the counsellor, who receive the job description and other input as student's referrals will create and update records immediately through their terminal. The input can also be verified

immediately through the terminal screen.

- (2) All the counsellors viewing student records will be seeing the same, latest version on the screen.
- (3) Saving cards and forms needed to print out verification copies of student and job records means a reduction of duplication and of the large expense of internal paper.
- (4) The counsellor will have more time to add or cancel student or job information.
- (5) Coordinates the information flow through the office and prevents misuse. Thus security is increased.
- (6) The system improves productivity, and improves the accuracy and quality of work, thereby reducing the labour costs.
- (7) Job dissatisfaction would decrease, hopefully reducing turn over and illness.
- (8) Computers have become easier for the untrained user to use successfully.
- (9) The system is easy to use, easy to learn, and easy to extend or modify.
- (10) The system avoids as well as detects errors.

On the other hand, there are some disadvantages of the new system. These are:

- (1) The Employment Centre at Concordia University would have to modify their lines of communication and their working system.
- (2) Typing letters and answering the telephone are office

functions that will remain critical to improving productivity.

- (3) Arranging meetings between the student and his counsellor is still not a computerized operation.

Despite these few disadvantages, it is clear that the many positive features of the new system make it worthwhile. In addition, there is potential for future improvements to the system. Some of these are described in the following section.

4.2 Future developments:

The new system can be reviewed from time to time in order to establish how it meets current requirements. The following three areas are possible improvements:

- (1) Create a flexible Natural Language (NL) processing system. By the NL technique, the student or the counsellor can communicate with the computer using English language to meet his needs.
- (2) Use either of French or English in the conversation between the user and the computer. That means the system asks the user if he prefers to communicate with the system using the French or English language. Depending

on the user's choice, the system starts to display the menus, prompts, and all the error messages in French or English.

- (3) In our new system the secretary still arranges the interviews between the student and his counsellor at the Employment Centre. But for the future, the secretary's work must be computerized also. In other words, if the student finds an interesting job, the computer system will arrange an interview between the student and his counsellor. In this way, the secretary will have more time to do types of work efficiently such as typing or preparing office documents.

The system described in this report will increase the efficiency of the job-placement services at the Employment Centre at Concordia University and will also increase the satisfaction of its student and counsellor uses. Once the system is installed, it will be easy to modify it according to the changing requirements of the Employment Centre in the future.

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Appendix 'A'

A sample example for the student part

This appendix contains an example of the student part inquiry of the new proposed system. First, to facilitate the logic sequence we will give a dialogue tree that helps us understand our example (see Figure A-1).

The first screen in Figure A-2 asks the student if he has already stored his Curriculum Vitae at the Employment Centre at Concordia University. If the student's answer is 'NO', then the system displays some information about itself and then it begins to provide prompts in order for the student to fill in his Curriculum Vitae. If the student's answer is 'YES', then he must key in his S.I.N. and his I.D. correctly. That will happen by using screen 2 (see Figure A-3). If the student's entries are not correct, then the system will give an error message and will let the student enter his data again. But if the S.I.N. and I.D. correspond to the S.I.N. and I.D. of the record being accessed, the system will display the master menu in screen 3 (see Figure A-4). Depending on which item the student selected from screen 3, the system will go forward with the student. For example, if the student selected item

number 2 (i.e. classification of jobs) the system will display all the jobs classification in two menus (see Figures A-5a and A-5b). In this position, the student may select a specific job from the first jobs-classification menu (for example, his choice is 21 as in Figure A-5a). The system will then display screen 5 (see Figure A-5b) which has two parts. The upper part contains the job description while the lower part has another menu that gives the student certain choices. The student now has 4 choices; if he selects the first item (i.e. fill out an application), then the system displays screen 6, which is the last screen in our example here (see Figure A-7). This screen gives the student a prompt to fill out an application. The system prints this application directly as soon as the student has finished his entries. The student gives this application to the secretary who arranges an interview between the student and the counsellor.

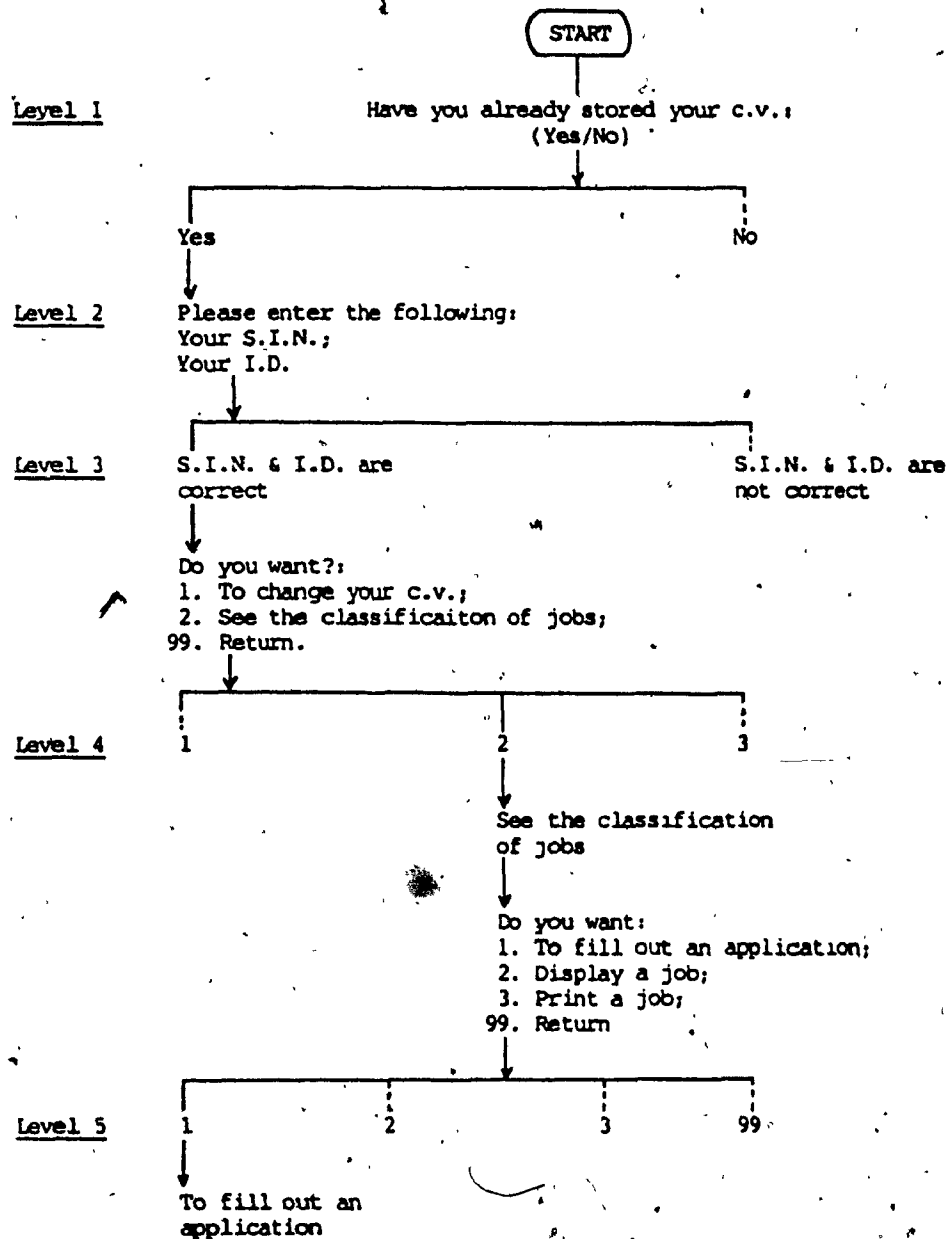


Figure A-1

The dialogue tree for an example for the student part

Canada Employment Office
(Concordia University)

Have you already stored your

Curriculum Vitae? (YES/NO) : YES

Note : Input is underlined

Figure A-2

Screen number '1'

Welcome to the Canada Employment Office
(Concordia University)

Please enter the following :

Your Social Insurance Number : 123456789

Student number : 3456789

Note : Input is underlined.

Figure A-3

7
Screen number '2'

What do you want to do ?

1. Change any information in your record

2. Classification of jobs

3. Return to the first menu

Please enter your choice : 2

Note : Input is underlined.

Figure A-4

Screen number '3'

Classification of jobs (menu 1) :

Select one:

- 11. Mnagerial and administrative
- 21. Natural science, engineering and mathematics
- 23. Social science
- 25. Religion
- 27. Teaching
- 31. Medicine and health
- 33. Artistic, library and performing arts
- 37. Sports and recreation
- 41. Clerical
- 51. Sales
- 61. Service occupation

- 15. Access the second part of the job classification
- 99. Return to the first menu

Please enter your choice : 21

Note : Input is underlined

Figure A-5a

Screen number '4'

Classification of jobs (menu 2) :

Select one:

- 71. Farming, Horticular
- 73. Fishing, hunting
- 75. Forestry and logging
- 77. Mining and quarring including oil and gas field
- 82. Processing occupation
- 83. Machining and related occupations
- 85. Product fabricating, assembling and repairing
- 87. Construction trades
- 91. Transport equipment operating
- 93. Material handling
- 95. Other crafts and equipment operating
- 96. Occupation not elsewhere classified

99. Return to the first menu

Please enter your choice :

Figure A-5b

Classification of jobs (menu 2)

Job description

Occupational code : 2100-00
Job number : 3
Job title : Programmer
Salary : \$ 23,000
Job location : Montreal
Requirements : (I) 5 years experience
(II)
(III)

What do you want ?

1. Fill out an application
2. Another job for the same classification
3. Print the job
99. Return to the classification menu

Please enter your choice : 1

Note : Input is underlined

Figure A-6

Screen '5'

JOB REQUEST FORM

Occupational code : 2100-00
 Job number : 3
 Job title : Programmer
 Salary : \$ 23,000
 Job location : Montreal
 Requirements : (I) 5 years experience
 (II)
 (III)

Application to (Name of firm) : Bell

Canada

Your family name : Robert

Your major : Computer

Science

Type of work :

(Full time=1, Part time=2, Summer=3): 1

What do you want to do ?

1. Fill out an application
2. Another job for the same classification
3. Print the job
99. Return to the classification menu

Please enter your choice : 1

Note : Input is underlined.

Figure A-7

Screen number '6'

Appendix B

A sample example for the counsellor part inquiry

This appendix gives an example, of the counsellor part of the proposed system. First, to simplify the logic sequence we will explain our example by using the dialogue tree technique (see Figure B-1).

Screen 1 (see Figure B-2) asks the counsellor to enter the student's I.D. number. The counsellor must key in the I.D. correctly; otherwise the system will display an error message telling the counsellor that he has tried to access a wrong record. If the counsellor's entry corresponds to the I.D. being accessed, then the system will display the master menu (screen 2) in the counsellor part (see Figure B-3). Screen 2 has five choices and depending on the counsellor's choice, the system goes forward with the counsellor. For example, if the counsellor selects item 3, then he will see new screen, i.e. screen 3, (see Figure B-4). Screen 3 offers certain choices for seeing, updating or printing a job. Suppose the counsellor selected item number 2 in screen 3 (i.e. modify a job). Then the system will execute his request in three stages. The first stage is executed by screen 4 (see Figure B-5a) that contains all

the job description items and asks the counsellor which item he wants to modify. Suppose he selects item 4 (i.e. job location). The system will move to the second stage. Screen 5 (see figure B-5b) will display and contain the job description items before the modification and give the counsellor a prompt to help him enter the new transaction for the job location. The last stage of the modification process is represented by screen 6 (see Figure B-5C) that gives the counsellor the new record after the modification. At this time, the counsellor has the choice of telling the system that he wants to make another modification in the same record or that he wants to get out of this menu.

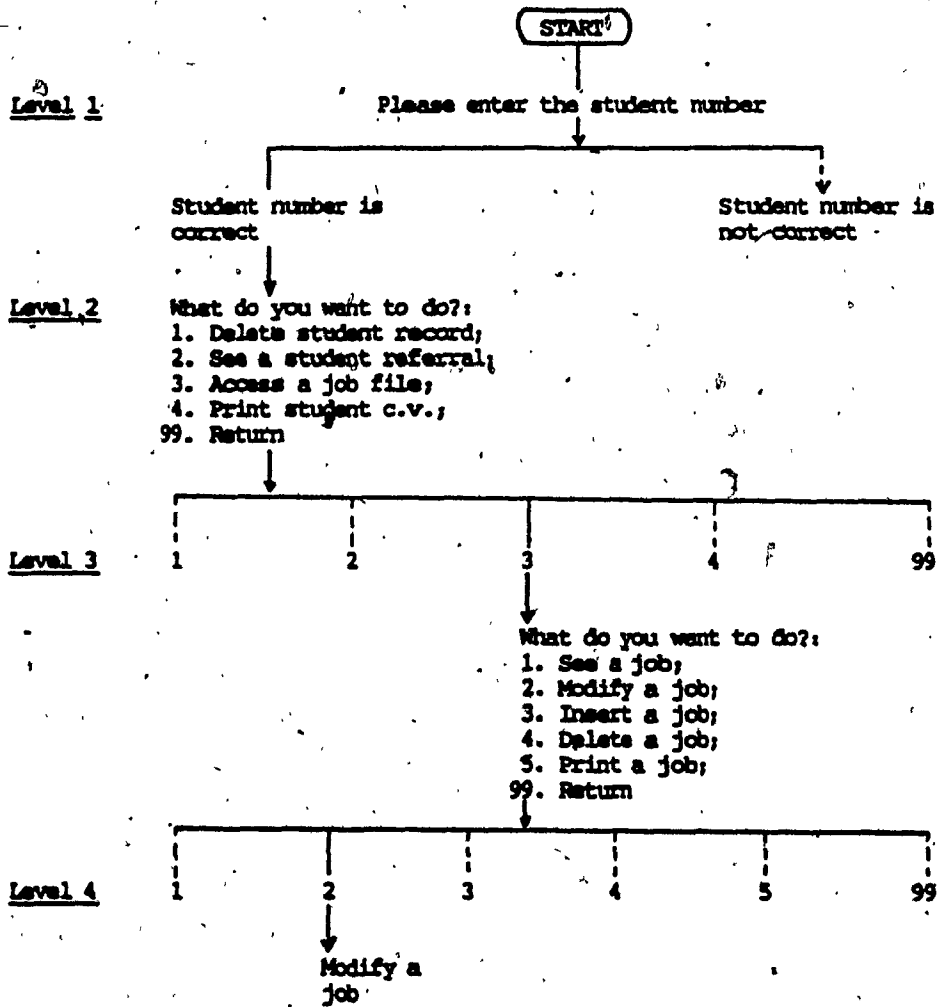


Figure B-1

The dialogue tree for an example of the counsellor part

Canada Employment Office

(Concordia University)

Welcome to the Canada Employment Office

Please enter the student number : 3456789

Note : Input is underlined.

Figure B-2

Screen number '1'

What do you want to do ?

1. Delete a student record from the
Employment Office.
2. Display the student history
3. Access the jobs file
4. Print a student application
99. Return to the first menu

Please enter your choice : 3

Note : Input is underlined

Note : The student history here means
the student-counsellor interviews
at the Employment centre.

Figure B-3

Screen number '2'

Canada Employment Office
at Concordia University

What do you want to do ?

1. See a specific job
2. Modify a job
3. Insert a job
4. Delete a job
5. Print the job
99. Return to the first menu

Please enter your choice : 2

Note : Input is underlined.

Figure B-4

Screen number '3'

What do you want to modif ?

1. Job number : 3
2. Job title : Programmer
3. Salary : \$ 23,000
4. Job location: Montreal
5. Requirements : (I)
6. (II)
7. (III)

Please enter your choice : 4

Note : Input is underlined

Figure B-5a

Screen number '4'

What do you want to modify ?

1. Job number : 3
2. Job title : Programmer
3. Salary : \$ 23,000
4. Job location: Montreal
5. Requirements : (I)
6. (II)
7. (III)

Enter new job location : Ontario

Note : Input is underlined

Figure B-5b

Screen number '5'