

## **INTRODUCING MAKLUM - THE GENERAL REFERENCE EXPERT ADVISER DEVELOPED FOR A UNIVERSITY LIBRARY**

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### **ABSTRACT:**

*Describes the development of a standalone expert system called MAKLUM which aims to provide answers to general reference enquiries relating to library facilities, services, regulations, loans, membership, location of items, public amenities, etc. The Adviser is developed for the main library of the University of Malaya using the expert system shell, CRYSTAL 4.50. The system can run from any personal computer with DOS. Fifteen undergraduates tested the system of which 73% rated the Adviser as very good, excellent, and 84% liked most the system's ease of use and its user interface. Information about library services, facilities, borrowings and reference privileges are the mostly sought after by the undergraduates.*

**Keywords:** Expert systems, Reference services, Reference enquiries, Academic libraries, Automated Adviser, MAKLUM, CRYSTAL 4.50, General enquiries, Library services.

### **INTRODUCTION**

In most academic libraries general type of reference enquiries usually peak during the first few weeks of a new academic year. Even in normal times, this type of enquiries would easily constitute the largest proportion of total enquiries received (Gers and Seward, 1985). To cope with the situation, some academic libraries use clerical staff to handle such enquiries. At busy times and especially during library orientation weeks which are normally incorporated into new undergraduate / postgraduate induction agenda, staff members are mobilised to help in the registration of new members, help desk

duties, or conducting library tours. It is during such periods that both professional and support staff are often stressed for time to properly entertain general type of reference enquiries.

It is in this situation, that an automated adviser can be of utmost use to free clerical and professional staff of general help desk duties and hence they can pay closer attention to specific type of enquiries (Miller, 1984). The objective of this paper is to describe the development of a computer based expert adviser which handles general reference enquiries for a university library. The Adviser is named MAKLUM, which in the Malay language

means "to inform". MAKLUM is an expert system adviser developed to answer general reference enquiries.

MAKLUM aims to emulate the person at the quick reference desk and endeavours to answer basic enquiries such as; (a) library regulations; (b) opening hours during semesters and vacations; (c) membership; (d) borrowing and reference privileges; (e) types of collection available; (f) professional services available; (g) library facilities which can be utilized by various categories of members and (h) about the OPAC (Online Public Access Catalogue).

### METHODOLOGY

The system is developed using an expert system shell, CRYSTAL 4.50 (1990). A shell is chosen for the following reasons:

- It is less procedure intensive which allows the developer to concentrate on knowledge acquisition needed for the system's knowledge base.
- It is menu driven and therefore can be easily constructed.
- A shell often keeps its knowledge base separate from the inference engine which manipulates it and this feature allows for the knowledge base to be easily updated. This is important in the reference information context where policies, regulations and opening hours are subjected to frequent changes.
- It allows for a PC based system to be developed and this would nicely fit into the standalone adviser scenario

aimed for this prototype and can be placed at the entrance foyer of the main library.

MAKLUM underwent five phases of development following the classical software development methodology. The phases comprises (a) problem identification or feasibility study; (b) analysis of user and system's requirements which also includes collating knowledge of information needed for the knowledge base; (c) designing a model of the system on which the menus, display and conclusion screens are based; (d) coding all information collated into a format understood by CRYSTAL which supports the rule-base backward chaining procedure and (e) subjecting the system to user testing to identify strong areas or weaknesses so that enhancement can be carried out accordingly.

The system is developed by using the Main Library of the University of Malaya as the model. Only the main library is included in this prototype reference adviser in order to fully understand the capabilities of CRYSTAL in handling procedures before a complete system is developed for the whole library system.

### THE FRAMEWORK FOR MAKLUM

The development framework for MAKLUM follows along the five phases mentioned above which will be described in full in this section.

**Problem identification.** The problems identified with regard to work at the reference desk are as follows:

a). General questions constitute a large proportion of total number of enquiries received. General type of reference enquiries are those which focus on directional transactions, policies, services, holdings, locations of specific items and membership. At the Main library, University of Malaya, general reference enquiries constitute about 70% of total enquiries received each year. Table 1 shows the figures obtained from the Circulation Division at the main university library for the year 1995. The Table indicates that 700 general enquiries were received at the "general help desk" at the entrance of the Circula-

tion Hall for about three weeks at the beginning of the July session 1995/1996. This help desk was manned by professional staff from other departments of the main library who volunteered for this duty and was a temporary service (between 17 July and 12 August, 1995). All enquiries received at this desk are general in nature and constitute about 6.8% of total enquiries received during 1995. General reference enquiries received at the professional help desk within the Circulation Office (the permanent help desk) totalled about 7,500 which constitutes 73% of total reference enquiries received.

Table 1 : Type of Reference Enquiries Received by the Main Library, University of Malaya in 1995 \*

Type of enquiries	Location	Duration	Number	Percent
General enquiries	General help desk (Orientation period)	17 July-12 August	700	6.8
General enquiries	Prof help desk	All year round	7,500	73
Specific search enquiries	"	"	500	5
CD-ROM search enquiries	"	"	1,500	15
NST online search	"	"	70	0.7
		Total	10,270	100.0

\* This information is compiled from information supplied by Puan Ruzita Ramly, the reference librarian who was kind enough to look through the Division's reference enquiries file.

This desk is manned by a professional staff throughout the year. The figures from the table indicate that general type of enquiries take up most of professional's time.

b). The general type of reference enquiries are repetitive in nature. Because of this characteristic, reference librarians often find this type of enquiries irksome and irritating. In other words it does not fall within the category of enquiries which reference librarians enjoy dealing with.

c). A majority of the answers to these general type of enquiries can be obtained from booklets, leaflets, reports published by the library. These publications are freely available on request to all patrons. However, users seem to prefer to ask the person at the desk. Other studies have indicated that users do not like to be given documents and prefer an immediate answer to enquiries (Davies; Smith and Morris, 1992). The development of an automated Adviser is therefore thought to be a feasible venture because it would provide answers to repetitive questions readily at all times, even after service hours when skeletal staff are available. Some studies have indicated that automated enquiry systems are well received by users. (Smith, 1989; Fadell and Myers, 1989).

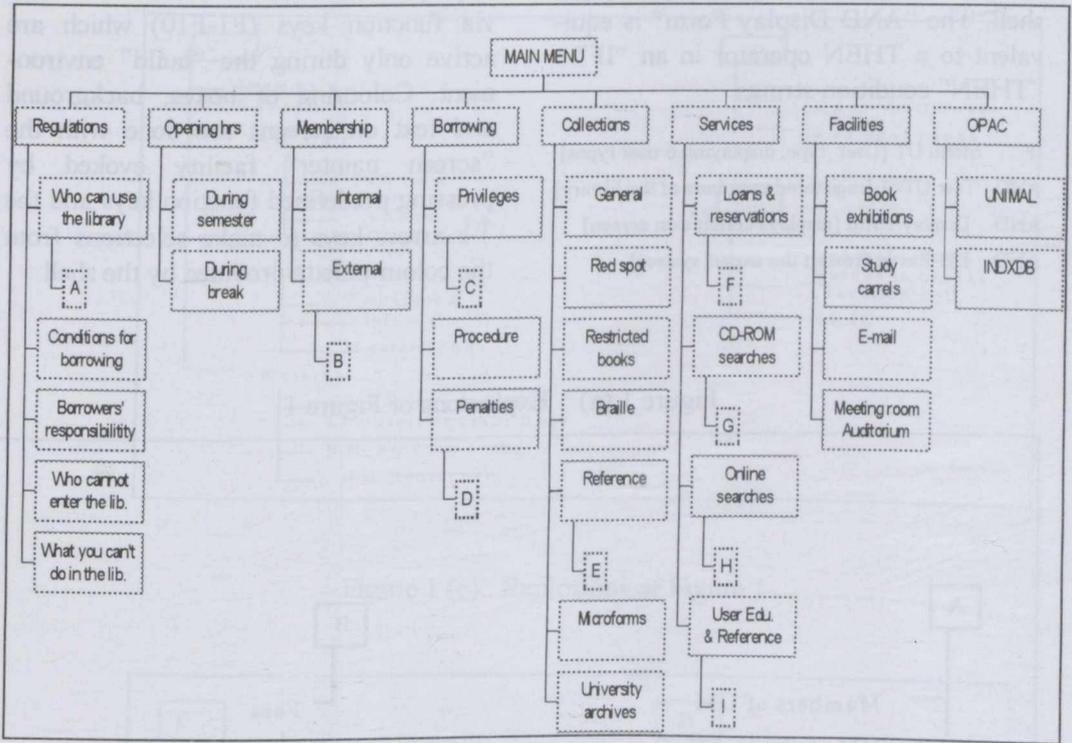
#### **Analysis of the systems requirements.**

The main focus of this phase is the gathering of facts from which the knowledge base of the system will draw. This is often called the knowledge acquisition stage. This phase comprises two stages.

The first stage involves gathering basic information which falls within the realm of "general information enquiries". All information pertaining to regulations, services and facilities provided at the main library, University of Malaya are collated. Facts are collected from pamphlets, leaflets and booklets published by the library; the library's guide book; details from membership forms, library circulars (on new penalty charges), and the library newsletter. The information is gathered and is presented in tabular forms under types of enquiries and the variables which affect each type are indicated. The second stage involved interviewing an expert who is an Assistant reference librarian at the main library. The expert helps to verify the accuracy and adequacy of the information gathered. New changes to policies and services were noted and corrections made on the tables.

**The system's design.** Based on the information gathered, a hierarchical model of the system was constructed which were utilised when designing the menu, display and conclusion screens. Figures 1 to 1(c) show the main hierarchical model and its explosion of branches within the hierarchy from which the menus and sub-menus are then designed. The system was developed in the English language and considerations were given concerning the simplicity of sentence structures and the logical breakdown of lines of questioning into suitable sizable chunks. Multiple choice menu type questions were selected rather than close ended ones because they reduce the necessity for users to type out answers and correct spellings and thereby do not become a hindrance in ob-

Figure 1: Hierarchical Menu for MAKLUM



taining answers (Richardson, 1989). Throughout this stage, the factor of making MAKLUM easy to manipulate for novice users influences questioning styles and display of information adopted. Basically, the Adviser provides eight types of information; a). regulations governing the library ; b). library opening hours; c). membership; d). borrowing /reference privileges; e). library's collection; f). professional services provided by the library; g). library facilities; h). OPAC; i). databases; j). location enquiries (menu M1, Appendix 1(a)). Appendices 1(b) to 1(e) show menu and conclusion screens when option for "Borrow-

ing/reference privileges" is chosen to indicate the line of enquiries provided by CRYSTAL.

**System implementation.** This phase involves translating design specifications into a form understood by CRYSTAL. CRYSTAL supports the rule based procedures. The rules are strings of conditional statements in natural language syntax which represents information gathered for the knowledge base. The condition statements use the operators IF, AND, OR and NOT to string a set of conditions in order to arrive at the desired conclusions. MAKLUM uses 26 menu and 69

conclusion screens. The operators precede each condition statements and are evoked via specific key strokes predefined by the shell. The "AND Display Form" is equivalent to a THEN operator in an "IF" - "THEN" condition strings.

```
IF Menu UT [User_type, displaying 6 user types]
AND Test UT=1 [registered members of the library]
AND Display Form [displays conclusion screen]
AND KB-Rerun [restart the expert system]
```

The program goes on to TEST UT=2 to 6 (for 6 categories of users). The menu, display or conclusion screens are evoked via function keys (F1-F10) which are active only during the "build" environment. Colouring of boxes, background and text on screens are done with the "screen painter" facility evoked by pressing predefined function keys and the ↑↓ arrow keys to make selections from the colour palette provided by the shell.

Figure 1 (a) : Explosions of Figure 1

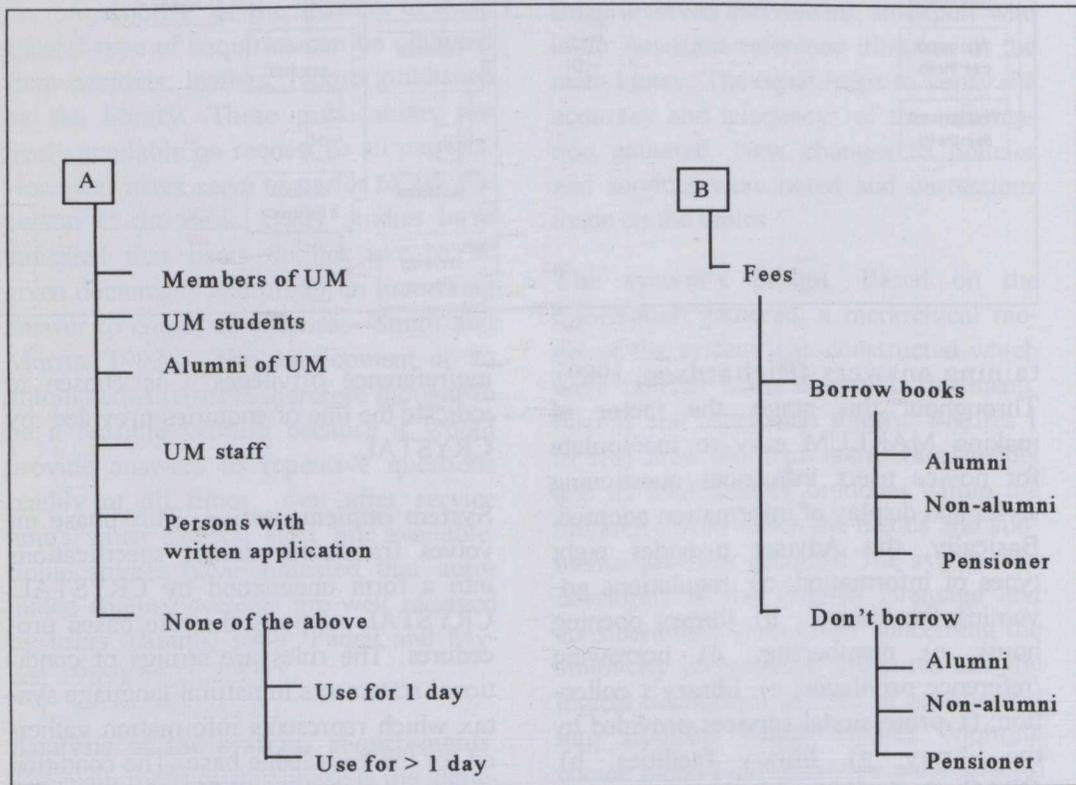


Figure 1 (b) : Explosions of Figure 1

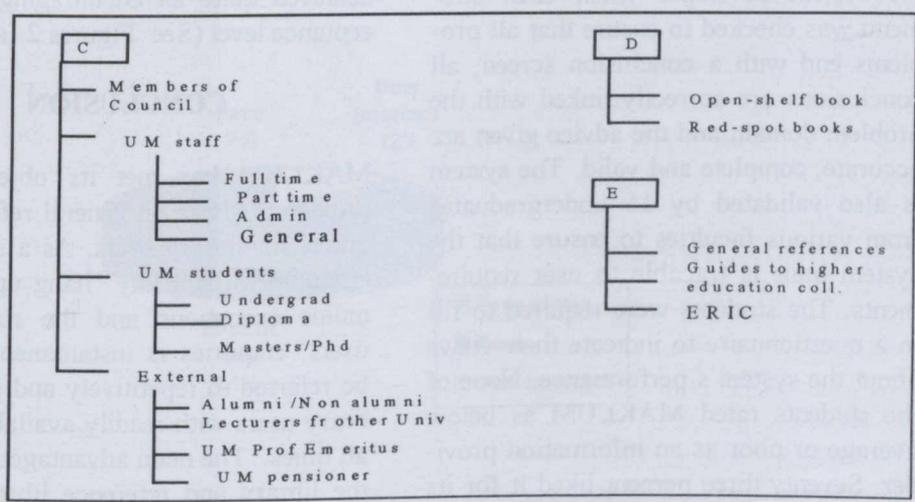
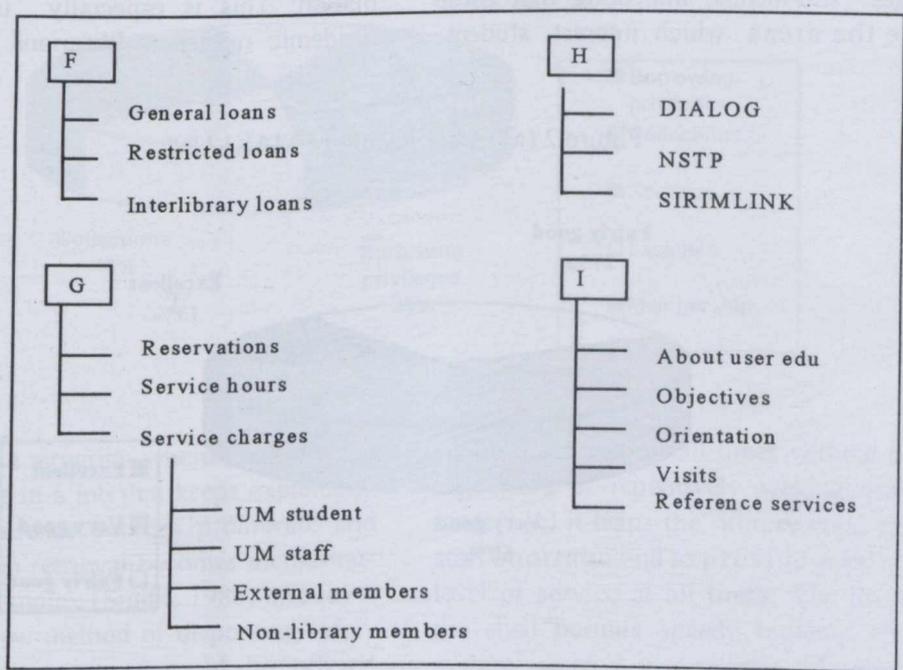


Figure 1 (c) : Explosions of Figure 1



**Testing the system.** The system is verified at each stage of its development by the system developer when each sub-menu was checked to ensure that all problems end with a conclusion screen; all conclusions are correctly linked with the problem domain and the advice given are accurate, complete and valid. The system is also validated by 15 undergraduates from various faculties to ensure that the system built is tracable to user requirements. The students were required to fill in a questionnaire to indicate their views about the system's performance. None of the students rated MAKLUM as below average or poor as an information provider. Seventy-three percent liked it for its ease of use; 6% for its pace and 11% for its user interface. Most students who used the system opted for the "Library facilities" and "Borrowing and reference privileges" sub-menus, indicating that these are the areas which interest student

users most. The results of the questionnaire show that MAKLUM have achieved quite an encouraging user acceptance level (See Figures 2 (a)-(c)).

## CONCLUSION

MAKLUM has met its objectives, in providing advice on general reference enquires for library users. As a system, it is stable without any "hang ups" during online executions and the response to users' enquiries is instantaneous. It can be referred to repetitively and provide library users with readily available help at all times. The main advantages gained by the library and reference librarians are; (a) professional librarians would be free from answering routine questions and can pay attention to specific enquiries needing more detailed searching for information. This is especially useful for academic reference librarians who are

Figure 2 (a) : User Rating of MAKLUM

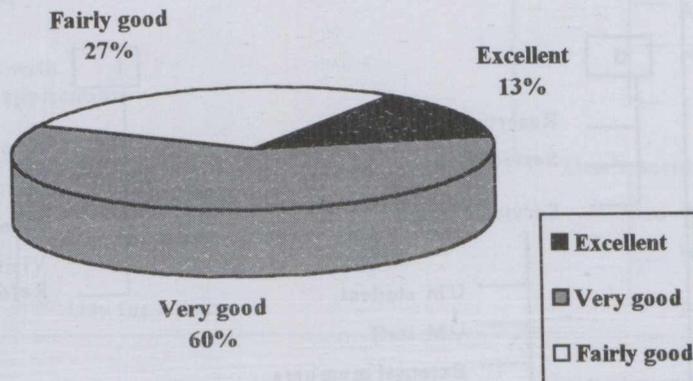


Figure 2 (b) : Strength of MAKLUM

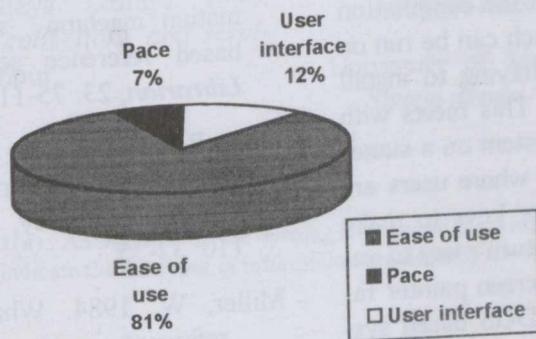
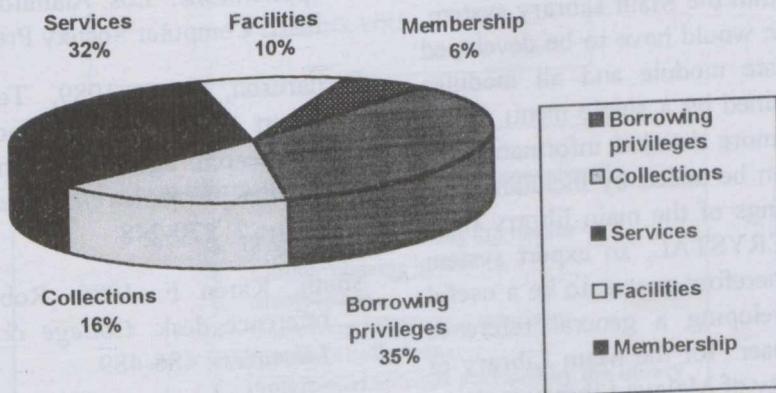


Figure 2 (c) : Selection of sub-menus by 15 undergraduates



caught in a situation where there are too few people in a job that keeps expanding, where reference sources proliferate and information retrieval becomes increasingly more complex (Smith, 1986) and (b) it offers a new method of dispensing information where users would be offered

“consistent” help at all times without being afraid of repetitively seeking assistance; (c) it helps the library cope with staff shortage and to provide minimal level of service at all times. The use of the shell permits speedy building of a system since it incorporates inferencing

techniques (methods of manipulating the knowledge) and an environment that enhances the knowledge acquisition process (Raeth, 1990).

CRYSTAL also supports the compilation of a run time version which can be run on any "A" drive without having to install the CRYSTAL software. This meets with the aim of running the system on a stand-alone personal computer where users are required to use the arrow keys to make choices and press the <return> key to validate their choice. The screen painter facility adds "life" to this DOS based system achieving attractive multiple choice menus and conclusion display screens.

Future potential enhancement to this prototype would involve including reference information about other branch libraries within the Main Library system. Each branch would have to be developed as a separate module and all modules would be joined by a single menu expert system. A more detailed information on locations can be added by including pictorial drawings of the main library floor diagrams. CRYSTAL, an expert system shell have therefore proven to be a useful tool in developing a general reference enquiry Adviser for the Main Library of the University of Malaya Library system.

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**Appendix1(a)** : An example of the opening and second main menu screen which indicate the ten types of information provided by the Adviser

Opening  
Screen

- WELCOME TO MAKLUM -

Hello! I am an Expert System. I am here to provide you with general information about the UM Main Library. Please press <ENTER> if you want to proceed.

THANK YOU

Option  
menu  
M1

↓

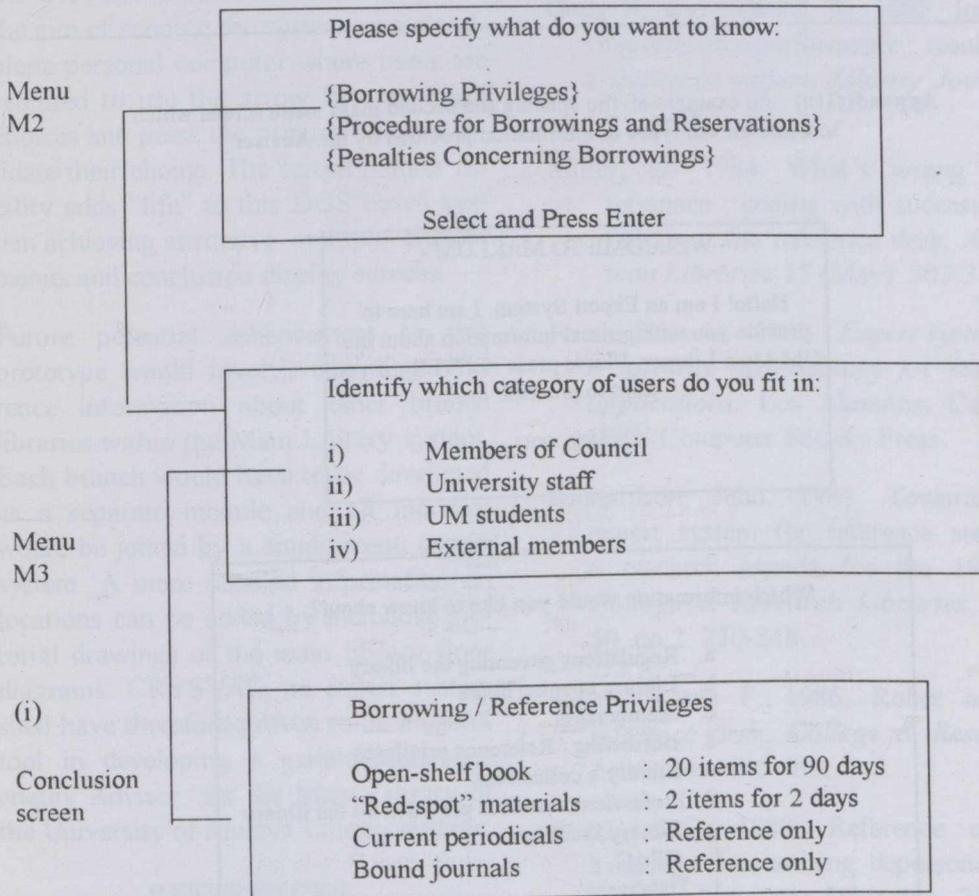
Which information would you like to know about?

- a. Regulations governing the library
- b. Library opening hours
- c. Membership
- d. Borrowing / Reference privileges
- e. Library's collections
- f. Professional services provided by the library
- g. Library facilities
- h. OPAC
- i. Databases
- j. Location enquiries

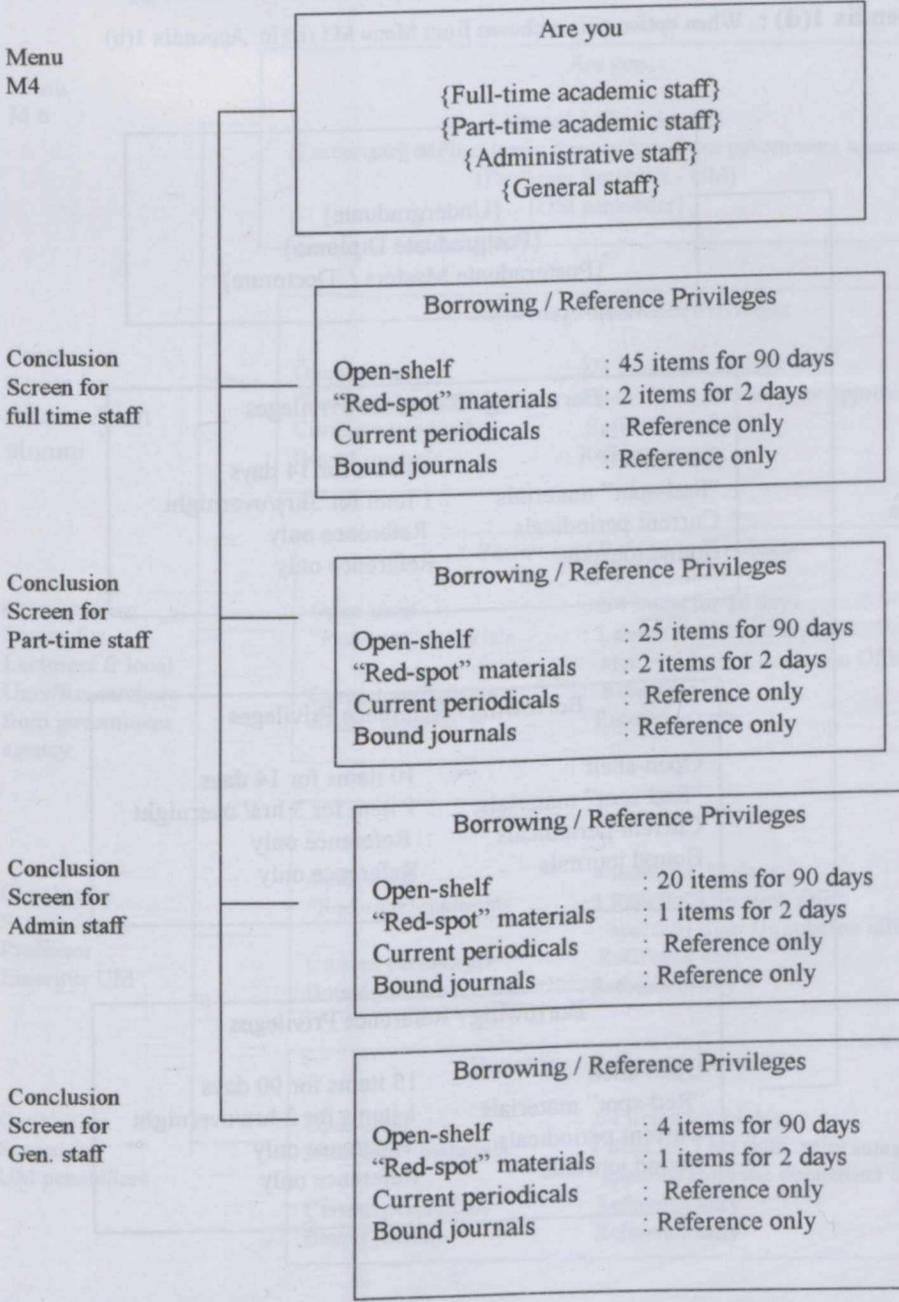
Select and press enter

**Appendix 1(b):** Examples of screens covering borrowing/ reference privileges which undergraduates most often consult

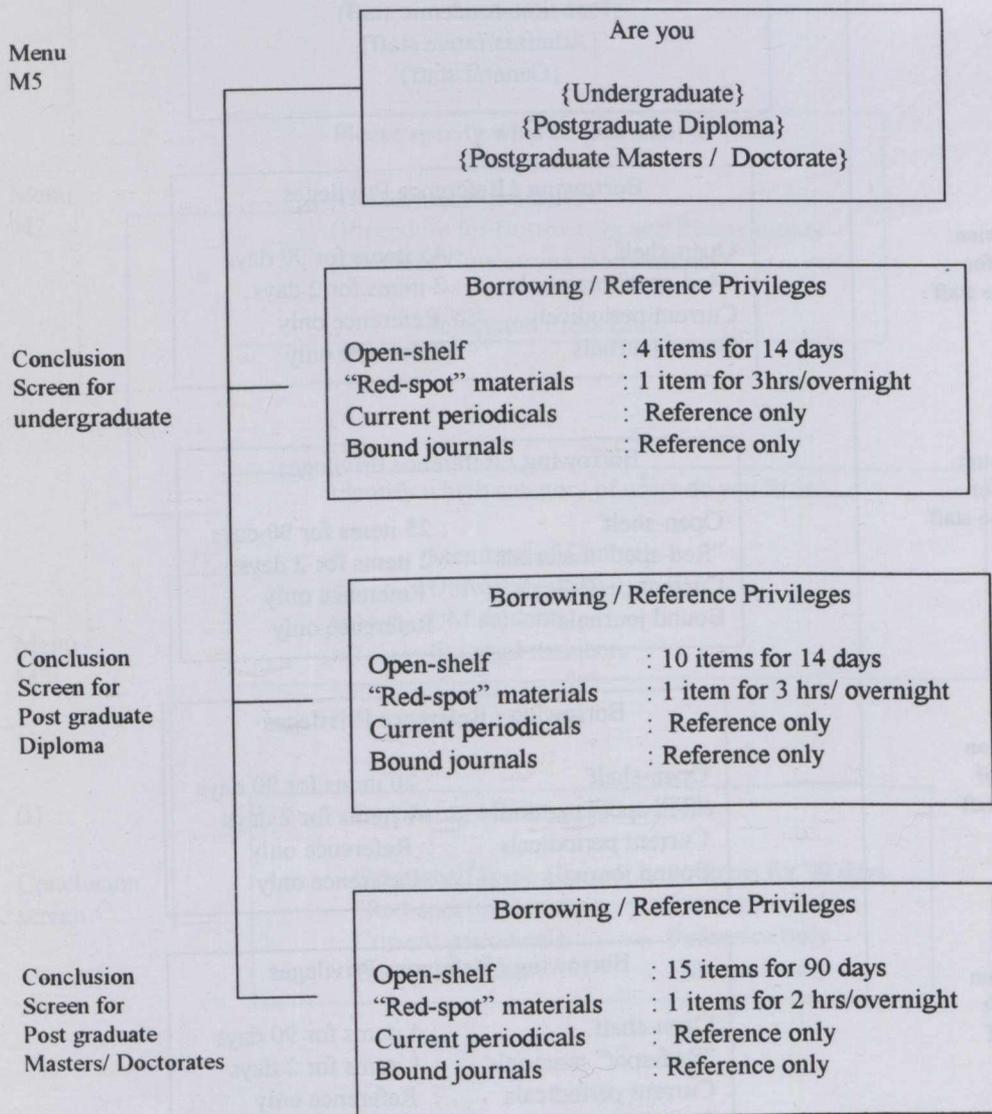
When (d) is chosen from the option menu M1 in Appendix 1(a)



**Appendix 1(c)** : When option (ii) is chosen from Menu M3 (ii) in Appendix 1(b)



**Appendix 1(d) :** When option (iii) is chosen from Menu M3 (ii) in Appendix 1(b)



**Appendix 1 (e) :** When option (iv) is chosen from Menu M3 (ii) in appendix 1(b)

