STUDY ON THE USE OF CDS/ISIS FOR ONLINE PUBLIC ACCESS CATALOGUE FOR INDONESIAN UNIVERSITY LIBRARIES: CASE OF BOGOR AGRICULTURAL UNIVERSITY LIBRARY

A study submitted in partial fulfilment of the requirements for the degree of Master of Science in Information Studies

at

THE UNIVERSITY OF SHEFFIELD

by

ABDUL RAHMAN SALEH

August 1991
ACKNOWLEDGEMENT

I wish to thank all those who have helped me during my study here at the University of Sheffield. My deep gratitude goes to my supervisor, Professor M. F. Lynch, for his generous advice, continuous guidance and support to me during the preparation of this dissertation.

I also would like to thank:

- All lecturer at the Department of Information Studies, especially Mr. Nigel Ford and Miss F. E. Wood for their encouragement and guidance during my study at the University of Sheffield. I found it was very useful.

- My government c.q. World Bank Project XXI; Library Implementation Unit (UKKP); Bogor Agricultural University for giving me an opportunity to study in the UK.

- The British Council who always help me during my stay in the UK.

I thank my wife, Juningsih, for love, affection, encouragement, and unflagging support she had shown to me and for carrying the whole responsibility in my absence. I also thank my lovely children, Bayu and Silvia, for their tolerance and patience during my absence.

Finally, I thank my parents and my brothers and sisters for their continuous prayers.

Sheffield
ABSTRACT

This study attempts to explore and examine the possibility of the use of Micro CDS/ISIS for Online Public Access Catalogue to support the library network and resource sharing in Indonesian University Libraries. The characteristic and performance of Micro CDS/ISIS Software package, which is released by UNESCO is presented. Some literatures in Micro CDS/ISIS are reviewed to give an understanding of the software. Review on Local Area Network technology as well as library automation is presented in the early chapter. It is intended to establish the understanding for developing idea of the importance of computer technology in library automation especially for creating automated library catalogue as well as bibliographic databases. The library development in Indonesia is also discussed to give a brief information about the condition of libraries, especially university libraries, in Indonesia. Although it is not very deep, a University Library Network in Indonesia is also presented in this study. It is intended to give a background information about the readiness of the Indonesian University Libraries in adopting a computer technology. Finally, the database for OPAC is created to examine how good the CDS/ISIS in supporting the OPAC database. This study also attempts to explore the possibility of importing records from other databases into the CDS/ISIS database. DBTOISIS program, program to convert any record format in ASCII text file into the ISO 2709 record format was created in this study.
## Table of Contents

1 Introduction .................................................. 1
   1.1 Background .............................................. 1
   1.2 The purpose of study ................................. 3
   1.3 Scope and coverage of study ......................... 4
   1.4 Methodology ............................................. 5

2 Library Automation .......................................... 6
   2.1 Computer technology development .................... 6
   2.2 The Advantage of Computerisation in Library ........ 8
   2.3 Local Area Network ..................................... 10
      2.3.1 The Purpose of LAN ............................. 12
      2.3.2 Classification of LAN ........................... 14
   2.4 The Role of LAN in Library and Information Science .. 16
   2.5 The Role of LAN in Indonesian Library Service .... 18

3 Library Automation in LDCs ................................. 21
   3.1 Less Developed Countries (LDCs) ..................... 21
   3.2 Library Automation .................................... 22
   3.3 Some Constraints of Information Technology Application in LDCs 24

4 Library Automation in Indonesia .......................... 27
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Background</td>
<td>27</td>
</tr>
<tr>
<td>4.2 Library and Information Services</td>
<td>30</td>
</tr>
<tr>
<td>4.3 The Library Network in Indonesia</td>
<td>32</td>
</tr>
<tr>
<td>4.4 Computer-Based Network Plan</td>
<td>37</td>
</tr>
<tr>
<td>4.5 Bogor Agricultural University Library</td>
<td>39</td>
</tr>
<tr>
<td>5 Online Public Access Catalogue</td>
<td>42</td>
</tr>
<tr>
<td>5.1 introduction</td>
<td>42</td>
</tr>
<tr>
<td>5.2 The Characteristics of OPACs</td>
<td>44</td>
</tr>
<tr>
<td>5.3 Type of OPACs</td>
<td>46</td>
</tr>
<tr>
<td>5.3.1 The First Generation of OPAC</td>
<td>46</td>
</tr>
<tr>
<td>5.3.2 The Second Generation of OPACs</td>
<td>46</td>
</tr>
<tr>
<td>5.3.3 The Third Generation of OPACs</td>
<td>47</td>
</tr>
<tr>
<td>5.4 Advantages and Disadvantages</td>
<td>48</td>
</tr>
<tr>
<td>6 The CDS/ISIS Software Package</td>
<td>49</td>
</tr>
<tr>
<td>6.1 The Feature of the Software</td>
<td>49</td>
</tr>
<tr>
<td>6.2 The Function of The CDS/ISIS</td>
<td>51</td>
</tr>
<tr>
<td>6.2.1 The User Program Services</td>
<td>52</td>
</tr>
<tr>
<td>6.2.2 The System Program</td>
<td>54</td>
</tr>
<tr>
<td>6.3 Format for Data Interchange</td>
<td>57</td>
</tr>
<tr>
<td>6.4 ISO 2709 Format</td>
<td>60</td>
</tr>
</tbody>
</table>
7 The Database Creation

7.1 Planning .................................................. 62
7.1.1 Objective .............................................. 63
7.1.2 Software Selection .................................... 63
7.2 Installing the CDS/ISIS .................................. 70
7.3 Database Design .......................................... 73
7.3.1 Field Selection ....................................... 73
7.3.2 Database Structure Definition ...................... 74
7.3.3 Data Entry Worksheet(s) Creation .................. 75
7.3.4 Indexing Technique(s) Definition ................. 75
7.3.5 Display and Print Format Definition ............... 76
7.4 Transfer Data to CDS/ISIS Database ................. 76
7.5 Data Transfer from CD-ROM ........................... 78
7.6 CDS/ISIS on Local Area Network ..................... 81

8 Conclusion and recommendation ..................... 84
8.1 conclusion ............................................... 84
8.2 Recommendation ....................................... 87

Bibliography .................................................. 88

Appendices .................................................. 92
## List of Tables

4.1 The Discipline Service Centres in Indonesian University Libraries 37

6.1 The element of ISO 2709 Leader ..................... 61

7.1 The Data Format of IPB Online Public Access Catalogue ...... 74

7.2 The Record in ASCII Text File ....................... 77

7.3 Record format according to ISO 2709 record format .......... 79

   The FDT of IPB database ............................ 92

   Indexing Technique for the IPB OPAC database ............. 97
Chapter 1

Introduction

1.1 Background

New technologies affect all aspects of our life and force change in established institutions including the library and information service. The role of computer technology for information and library services becomes more important today and especially in the future. This is because computer technology offers high speed, more efficient and better quality of services, which is needed by library and information service centre.

More recently, the consequences of that high technology in transfer of information to and from developing countries have been the subject of much concern nationally and internationally (Anderson, 1983).
Further development in communication technology and the applications of computers to library housekeeping operations have made it easier to extend co-operative among libraries. Almost all libraries in developed countries have responded by implementing information technology in their information services to take advantages of the computer's speed, accuracy and efficiency. They have been implementing computer in their services such as acquisition, cataloguing and classification, circulation control, serial management, etc. In contrast, many libraries in developing countries still use manual systems for their housekeeping operation. This can be attributed to many factors including foreign currency constraint, lack of computer-trained manpower, ineffective infrastructures such as power and telecommunication failures, and many others. However, the trend seems to be changing. The second half of the 1980s has seen quite number of library automation plans in the third world (Msuya, 1990).

In a country like Indonesia, a large part of the information services will be provided by libraries especially university and special libraries. Fast and accurate information retrieval is becoming a necessity for the daily operation of many sectors in such modern age. Because of the necessity to economize and to provide quick access to information the better university libraries should constitute an information network using computer technology in accessing as well as communicating the information, including bibliographical
and informational data, graphic, etc.

Since 1988 it has been established library network among state university libraries. The first task of this network is creation of union catalogue so that the information can be widely accessed by the users. The catalogue was planned to be created as computer-based catalogue or Machine Readable Catalogue.

1.2 The purpose of study

This study considers that the most important task for some libraries this time in the developing countries including Indonesia is the provision of catalogues. Its aim is therefore to improve access to library materials throughout the country for students, researchers and teaching staff. This study uses the term developing countries with special reference to Indonesia, and the specific example of Bogor Agricultural University Library.

Literature on library automation, online catalogue and electronic data transfer were reviewed to establish the basic understanding for developing idea of the importance of the library automation especially in building library automated catalogue. It is also discussed the advantages of library automation and the role of the local area network. This study finally at-
tempts to analyse Micro CDS/ISIS as an alternative software package for use in creating and building library online public access catalogue as well as bibliographic database for sharing the library resources in the developing countries.

Finally, this dissertation is written for fulfilling the final assignment from the Mature Entry Programme, M.Sc. Information Studies, University of Sheffield.

1.3 Scope and coverage of study

The Online Public Access Catalogue originally comes from the automated library catalogue. According to Hancock-Beaulieu (1989) Public Access here evolved in two different ways. Firstly, it meant access to library housekeeping circulation file designed primarily for staff use that could also serve as a rudimentary catalogue for the library users. The initial interest was not in the bibliographic data, but in the circulation data that was being made available to the public, thus enhancing the catalogue's function as a finding tool. The second route was to give the library user direct access to those machines readable bibliographic record from which card and computer output microform (COM) catalogue had been produced for more than a decade through shared centralised cataloguing.
This study is limited on the Online Public Access Catalogue designed for the users of the library as an information retrieval tool, which is enabling the library users direct access to the machine readable bibliographic records or database records. Discussion of computerised circulation control and cataloguing system (which can also be used for catalogue search) are beyond this study.

1.4 Methodology

This study is based on reviewing the literature in the use of CDS/ISIS as well as exploring in creating, designing small scale Online Public Access Catalogue. Implementing CDS/ISIS on a Local Area Network as well as importing records from other databases is also examined. A program to convert the record format from ASCII text file to the ISO 2709 record format is created using PASCAL programming language. Finally, a user guide "How to use the OPAC" is produced.

This study was started on the first week of April 1991 and was finished on August 1991.
Chapter 2

Library Automation

2.1 Computer technology development

Computer technology is based on the advances of two fields. The first is developments of microprocessor technology. This technology has brought about large scale reduction in size of computers. At the same time they have also increased their reliability and speed by several order of magnitudes (Thorpe, 1984; Zorkoczy, 1990). For example, by using photographic techniques, 65,000 components, in the 1980s, were packed in one "chip", the size of a little fingernail. In the early 1960s this chip only consists of 10 components (Rada, 1984). The latest development of microprocessor is even almost unbelievable. Very Large Scale Integration (VLSI) for example...
consists of over five million transistors and expected to reach over 100 million by the year 2000 (Zorkoczy, 1990). Mass production of microprocessor has caused reduction in cost. As a result, the computer price is become cheaper and more powerful. Simultaneous developments in large capacity, random access storage devices (disks) means that the stand-alone capabilities personal computers can be guide considerable. Disk or data storage is continuing to decrease in cost and increase in storage capacity. Five and quarter inch hard disk with 760 megabytes of storage has already been marketed. Using perpendicular recording method and newer materials, Maxwell Corp. of America announced the development of 30 megabytes metal floppy disk (Herther, 1987).

Secondly, there have also been remarkable advances in telecommunication technology, making possible the reliable, efficient, and high speed transfer of data around the world (Thorpe, 1984). According to Rada (1984) in 1965, a single satellite carried 240 telephone circuit, whereas in 1980s they could carry 12,000. In 1965, the cost per circuit per year was US $ 22,000, whereas in 1980s it was US $ 800. Decreasing costs also have been accompanied by a tremendous increase in the speed of transmission. With this technology, literature searching has been converted from card catalogue or printed indexes, to stimulating, interactive process using an online connection to remote databases. It is often located in computer centres hundreds
or thousands miles away. Furthermore, as full conversion from analogue to
digital transmission occurs, substantial additional efficiencies will be realised
that should result further substantial cost reduction (Summit, 1987). These
developments make them possible for many libraries in developed countries
and some developing countries to afford computers and a lot of them now
operate integrated systems.

2.2 The Advantage of Computerisation in Library

The impact of computers has permeated all sector of librarianship
and information retrieval especially in the developed countries. Only the
smallest libraries and information retrieval systems have escaped completely.
The potential of the computer technology is to make library material much
more widely available. The applications of computers in libraries can be
grouped into those concerned with housekeeping routines and those directed
towards information retrieval. With cooperative schemes and international
networks, housekeeping and information retrieval systems have increasing
amount in common.

Housekeeping applications of computers include aspects of serial con-
trol, cataloguing, ordering and acquisitions and the collection of management
statistics. In many areas, the greater standardisation, efficiency, co-operation
and improved services have been achieved as a result of computerisation. Computer is particularly appropriate in those organisations or co-operatives, whose number of transactions in any one of the housekeeping functions are large.

Micro computers have penetrate into information systems in the developing world, as there has been a growing recognition of the need to improve information resources and information exchange within the countries and the outside world. Information exchange is easier if there are national bibliographies that would serve as tools for locating the literature and analysing the information.

Computer is capable of storing large numbers of documents on mass storage devices and can cope with increasing growth of files. The information stored in the computer can also be retrieved quite easily at high speeds. In manual based system this would need an increase in the number of staff. Records held in a computer has more access point to allow the information stored to be available for a variety of uses. It is possible to search on most of fields defined such as titles, authors, and keywords, etc. Therefore it has higher degree of specificity and exhaustivity. Besides, it is also more accurate compared to those in manual files. The flexibility of the record stored offering users a variety of services as the records can be arranged and sorted in different ways. Computers also produce printed output that
could be very cost effective in terms of time and resources. Such advantages lead to better services for example in bibliographic applications, selective dissemination of information and current awareness would be done in a faster and convenient way (Hunter, 1985).

Another advantage of the computer applications in the library is that they facilitate easier communication with other computers and other computer systems. It is possible to access to the data using telecommunication links or by simply mounting a disk holding data to another computer. Such facilities facilitate more easily exchange of whole databases or section of databases. In other words, it permits fuller and wider cooperation between libraries and information services. From the library staff's point of view it can be mentioned that library automation could save time, staff and hence save money (Hunter 1985).

2.3 Local Area Network

When different computer devices within a limited geographic area need to communicate with one another, a local area network (LAN) should be considered. Boss (1985) defines Local Area Network is a facility that provides data communication - that includes voice and video signal - within building or among a close cluster of buildings. According to Hutchison (1988) local
area network is a network with a limited geographical coverage and simple topology. A further characteristic of local area networks is that they tend to be privately owned in contrast to wide area networks in which the communication's subsystem is based on the national telephone or data network. The consequence of this is that the organisation, which owns the local network has complete control over the hardware and software, which comprise its communications subsystem.

A local area network provides a data communications system that allows independent devices to communicate with each other. A local area network is distinguished from other networks by the area it serves; the speed at which information can be transmitted; the case with which new devices can be added and the simplicity of the basic transmission medium itself. A local area network can serve only limited geographic area. Generally this is limited to a single building or a single work site. Typically the distances involved are of the order of a few hundred meters up to a kilometer or so (Gee, 1983). According to Hutchison (1988) the maximum length of cable, which is classified as LAN is up to 10 kilometers, while Boss (1985) argued that in some cases LAN can extend up to as far as 25 kilometers.

Furthermore Hutchison (1988), based on the distance, classified network as follows:

11
• 0 m - 10 m computer peripheral

• 10 m - 10 km local area networks

• 10 km + wide area networks.

Based on this classification, Local Area Network occupies the middle ground between tightly coupled components of individual computer systems, and the traditional loosely coupled communications networks. Another distinguishing characteristic of LAN is that nowhere is use made of public services or facilities provides by national telecommunication authorities.

Normally, a local area network is understood to operate within an office block or across a factory or university campus, or other institution. According to Boss (1985) the typical LAN function is to provide local communications within a building or among adjacent buildings; however, a LAN can be connected by "gateways" to external data services or long distance communication systems.

2.3.1 The Purpose of LAN

There are many reasons for developing and using local area network, including message communication, resource sharing, file transfer, application
performance improvement, and combination of these functions (Flower and Thulstrup, 1988).

1. Message Communication

   With local area network it is possible to provide an electronic mail capability because the nodes are connected, thus allowing for the transfer of message from one node to another.

2. Resource Sharing

   As microcomputers proliferate, it becomes increasingly expensive for management to provide every worker with a fully equipped machine, including disks, printers, modems, and software. A more economical alternative is to provide only a minimum work station capability for hundreds of workers and provide a few expensive devices, which can be shared by many users. In some cases, certain users have repositories of software and files, which many users wish to access. Accessibility is improved significantly if user can access these resources electronically by file transfer from a server node to their work station or by using the server as a remote computer.

3. File Transfer

   A frequent need of computer users is to transfer a file that is stored on one local computer to another local computer. The file may consist of
programs, data, or both. There can be many reasons for doing a file
transfer, including:

- the program or data is needed at a particular local computer in
  order to execute a program.
- the file resides on a server node and the user want to transfer it
  to his or her work station.
- the user receives a request to transfer a file to another user.

4. Multiple applications

Seldom is a local area network built for a single application (for ex-
ample, electronic mail) or reason, but more likely for a number of the
reason given above. Since local area networks are built from general
purpose computer, it is possible to provide for a variety of applications
in a single local area network. Thus a user can integrate the appli-
cations of perhaps, data-base management, electronic mail, and word
processing.

2.3.2 Classification of LAN

Perhaps the most common classification of LAN is that based on topology,
which is defined the way in which stations are connected to each other, and
gives the logical shape of the network rather than its physical layout (Hutchi-
son, 1988). The physical topology describes the layout of the computers and the cables connecting them while the logical topology defines how network signals interact with the computers nodes (Flower and Thulstrup, 1988). The most common network topologies of LAN are: star, bus and ring.

1. Star configuration

In a star configuration, all devices are connected to a central control point using a single line for each connection. The central switch has responsibility for making connection between sending and receiving nodes. Many star LANs are based on private branch exchange (PBX) telephone system, rather than being independent and using their own coaxial cabling or fibre optic cable. They are, therefore, optionally dependent upon the reliability and loading of the central PBX controller. Although recent advances in transmission technology have increased the throughput of PBX-based lines, they often have relatively slow transmission capacity - 56 kilobits per second - for each twisted pair wire (Bess, 1985).

2. Bus Configuration

In a bus LAN structure, all connected devices typically "tap" into a single line or bus. The data bus cable is usually open-ended. Information packets flow outward in both directions from each point of connection.
Bus LANs are usually base on coaxial cable and may utilise dual parallel cable - one cable for traffic flowing in each direction. Ethernet is usually said to have a bus topology, but in reality is a tree consisting of a number of connected bus segments. Another, less convenient, way of looking at this is that a bus is special case of tree, being a tree which has no branch (Hutchison, 1988).

3. Ring Network

A ring network connects devices in fashion similar to bus configuration, but connect the ends together to form a continuous loop. Because of this circular shape, information packets can be routed in one direction around the system and all data will be received by all connected devices. Many such LANs use token passing and place a token at the start of packets to indicate whether it is already full or may be "loaded".

2.4 The Role of LAN in Library and Information Science

There is a great temptation to use LAN nowadays, because the possible applications could reach every area of information-based activities, as in office automation, and because the LAN's is fundamentally involved with the structure of information-based work. It has been mentioned that structurally LANs occupy the middle ground between the wide area networks and
computer buses. In the library and information science terms, the wide area network covers the public utilities such as Euronet and IPSS, other directly dialed services and the private networks based on British Telecom facilities, such as the cooperatives. The use of this middle ground for high speed information handling is particularly relevant to larger organisations (Collier, 1984).

The management benefits of resilience, flexibility, control and expandability claimed for LANs will be very attractive for library service. Many library tasks, particularly data entry, text editing, and word processing, could be economically carried out under local control at a workstation. The flexibility of being able to exchange station or reconfigure in the event of failure is important to libraries which are operating on low capital budget.

The most important implication of LANs is that they provide the prospect of entry into information technology at low cost. Until recently only libraries with substantial budgets could afford library computerisation on any scale. Many libraries now purchasing microcomputers in cheap price but with the danger of being locked into position from which they cannot expand. Microcomputer which is supported by a microcomputer network offers the potential for expansion either within the application or into new applications. Alternatively, a small library might find itself in the position where it had difficulty in justifying a case for computer facilities in isolation
but where the parent organisation was becoming involved in office automation. If suitable library modules were available the library might well justify inclusion as part of wider policy on information technology within the institution or firm. LANs, particularly the commercially available microcomputer networks, therefore, offer a clear potential for smaller libraries (Collier, 1986).

Gateways to remote databases might be provided, thus allowing access from points outside the physical locality of the library. In this case a consideration of interfacing wide range of devices which may be outside the scope of microcomputer network. Therefore, the library such as university library has to be linked to the university (university's computer centre) as its parent body which is assumed to have at least minicomputers or even mainframe.

2.5 The Role of LAN in Indonesian Library Service

It has been mentioned that the LAN provides a data communications system within limited geographical area and operates within an office block or across a building such as university campus or other institutions. LAN can also be connected by gateways to external data services or long distance communication system.
Having mentioned the basic feature of LAN, the idea of application of LAN technology has been arisen to take some advantages from this technology such as:

1. To increase the efficiency of the use of the existing personal computer by sharing storage device, printer as well as software which is need large storage space.

2. Centralised bibliographic database as well as public access catalogue so that the information can be widely accessed. It is very useful to the university which has scattered campus. For example, Bogor Agricultural University has four campus areas within the city of Bogor. For this reason the library of Bogor Agricultural University runs at least four branch libraries to provide an appropriate service and close to the potential users. Since the central library has an automation programme, especially an automated catalogue as well as bibliography, the library faces many problems to include the branches in this programme. Using LAN, the central library has possibility to put at least one PC as a workstation in each branch so that the users can access the union catalogue which is located in the central library from the branch.

3. Building or developing network with another institution such as special libraries which is scattered in the same region. For Bogor Agricul-
tural University library for example, LAN technology gives possibility to widen the service not only within the university but also to other institution, which are the neighbour of the Bogor Agricultural University Library, one of which is the centre of information network for agriculture and biology, that is Central Library for Agriculture and Biology. Network on resource sharing and interlibrary loan as well as information retrieval services have been established among libraries in the city of Bogor, especially between those two institution mentioned above. However, this network is carried out using traditional ways. This network might be even more effective and efficient if the data communication can be carried out using information technology such as computer and LAN technology.

4. Relating to information retrieval and interlibrary loan services mentioned above, LAN offer high speed such services, for example by using electronic mail for sending the requests.

5. Facilitate current awareness services as well as selective dissemination of information. This services can be carried out by using electronic mail and can be sent directly to the departments, or even to the individual teaching staff members in the university.
Chapter 3

Library Automation in LDCs

3.1 Less Developed Countries (LDCs)

Less Developed Countries (LDCs) or so called the Third World Countries comprise the wide range of socio-economic characteristics applied to the nations that middle income countries, as well as to the low income ones. Most LDCs nation are located in the southern hemisphere. Those country is every country except those in either the capitalist bloc of Western Europe, North America, Japan and Australasia or the socialist bloc of Eastern Europe and the USSR-in-Asia. Three quarter of the world population live within it (Lau, 1989; Moll, 1983).
Lau (1989), furthermore, added the characteristics of the LDCs such as:

“They are also termed information-poor nation, computer illiterate and regarded as industrially inefficient, in contrast to the high living standards, computer literate northern societies which have their new efficient high technology based industries, and now strong service oriented sectors. Moreover, the description of limited information technologies. Their production processed lack quality control and are prone to waste resources, either human or material ones.”

3.2 Library Automation

In recent years the new Information technology has completely changed the traditional way of gathering, retrieving and disseminating scientific and technical information in the developed countries. The advent of computers, electronic communications network, and huge databases have contributed to closing the information gap which was earlier thought to be unavoidable because of information overflow. In many western countries, using terminals in libraries and information centres is a daily routine.

The development of this Information technology in the High Developed Countries (HDCs) are now affecting the use of information technology in some Less Developed Countries (LDCs). In some LDCs assessment of a strategy for introduction overall of information technology has already been
extended to the library development and to applications of bibliographic services. There are more and more libraries, especially university libraries have been introduced to using "high technology" such as the use of computer, usually PCs, and online services to some extend, or at least online searching demonstration has been held by some private company to persuade the library in using their facilities. Tell (1980) mentioned that demonstrations of online searches made by the European Space Agency and UNESCO in countries such as Morocco, India and Kenya, show an interest and growing demand for online retrieval services among the developing countries. Demonstration by commercial organisations such as Lockheed and System Development Corporation in various part of the world has increased the appetite for utilizing the accumulated knowledge in databank.

There are of course a number of serious constraints to the application of new information technology in LDCs such as economic, technological, linguistic; but more often they are of political nature.

3.3 Some Constraints of Information Technology Application in LDCs

It has been mentioned that there are some major constraints in application of information technology in the development of information services in the LDCs. They have many needs in many areas, and information services
must compete for scarce financial, manpower and other material resources
with many other priorities, such as housing and food production. The con-
straint in application technology in LDCs may be grouped into three such
as economics factor such as shortage of finance; man power factor such as
low quality of man power, lack of trained staff relating to technological and
linguistic factor; and the poor telecommunication system.

1. Economics constraint

Although hardware based on microprocessor technology is now avail-
able at very low cost and is expected to continue to fall in the future,
and the PC-based system software to access database continues to de-
develop and is also expected to be cheap, some librarians in LDCs are
still pessimistic to apply information technology. This is because they
have a problem in getting budget, even for conventional library collect-
ion acquisition. Many observer will wonder how the LDCs precarious
economics will find the fund to establish even the basic infrastructure
necessary to support information technology (Moll, 1983).

Introduction of computer services without library back up facilities is
seen by some as counter productive. That is why some librarians in the
LDCs appear to be less enthusiastic about computer application than
many planners, decision maker and visiting "expert". It is needed a
political will from the government to solve this problem.
2. Man Power Constraint

One very serious problem of some aspects of the new information technology is the complexity of the task involved. This problem becomes more serious because most LDCs do not have the skilled staff to operate those complex technology. This is because of the librarian or information worker is not promising job for many people. Not many people, especially who have high qualification, choose librarian or information worker as his/ her career path. It is because the librarian or information worker in LDCs is often very low status. The professional librarians are regarded as mere custodians of books on shelves.

Another problem is most LDCs have serious inadequacies when it comes to knowledge of languages, especially in mastering of few of the world languages like English, French or Russian, languages in which the world’s scientific and technological knowledge is exposed in the primary and secondary journal literature. It is very difficult to master the technology which comes from foreign countries and of course in foreign language.

3. Telecommunication constraint

The introduction of commercial online bibliographic databases has been made possible for any user to have access to several million bibliographic citation in an interactive mode with an initial equipment in-
vestment of only communication terminal and telephone line. Because the online literature searching is generally carried out using national or international telecommunication network, it creates a problem for most LDCs. Many LDCs have only rudimentary telecommunication systems. Even if the capital city has adequate telephone links with the rest of the world, internal communications are usually far below standard required for reliable computer technology. The introduction of modern telecommunication infrastructure in rural areas is difficult even in the industrialized countries, since if rural network are operated in the same way as in urban areas, cost are prohibitive (Thorpe, 1984).
Chapter 4

Library Automation in Indonesia

4.1 Background

The Republic of Indonesia consists of a group of about 13,700 islands between the mainland of South-East Asia and Australia. The archipelago is the largest in the world stretching from the Malay peninsula to New Guinea. Indonesia had a total population in 1985 of 173.1 million of whom 61.5% live in Java which is only 7% of the land area. In 1990 its population is about 182.6 million (estimation) which is the fifth among the most populated countries (The Financial Times, 1991). The principal island are Java, Sumatra, Kalimantan (formerly Borneo), Sulawesi (formerly Celebes), Irian Jaya (West Papua), the Moluccas and Timor. The climate is tropical with the daily maximums and minimums range temperature between 31.1 and
18.9 degree Centigrade with the humidity averages 80 %. Rainfall never falls below 96.5 cm a year even in the driest areas (The Encyclopedia of the Third World, 1981).

Indonesia is a plural society with over 300 ethnic groups or tribes with their own languages, estimated to be more than 250. An estimated 90 % of the nation's inhabitants are Moslem. The official language is Bahasa Indonesia, derived from Trade Malay, used as a lingua-franca throughout the Indonesian islands. Bahasa Indonesia differs little from standard Malay and is principally distinguished by its large vocabulary of borrowed words from European languages, Arabic and Sanskrit (The Encyclopedia of the Third World, 1981).

In 1982, the Indonesian Gross National Product was US $ 90 billion. Between 1970 and 1982 industry and services, which represent 39 % and 35 % of GNP in 1982, grew at average annual rates of 10.7 % and 9.3 % respectively. Manufacturing, the most part of the industrial sector, representing 13 % GNP in 1982, grew at 13.4 % annual rate during the same period. This figure show that, within Indonesia with its large lower middle-income population, four-fifth of which is still rural, there exists a modern economy, comprising a large part of manufacturing, the oil sector and a number of services such as banking, financial and commodity trading, airlines, hotels and tourism. This Indonesia modern economic sector is equal to or greater than that of several
industrial high-income countries (UNESCO, 1985).

In the modern Indonesian sector the needs created by the introduction of new technologies, particularly in communication, are well perceived. In the early 1980s new system, called the Data Package Communication Link (SKDP), has been introduced, allowing customers to transfer computer-based data over telecommunication lines to another data centre within the country or abroad.

Fast and accurate data retrieval and transmission is becoming a necessity for the daily operations of many firms in the served by access to good special libraries. It is also recognised in Indonesia that any future sustained growth of the modern sector is contingent upon the development of national research and development facilities, necessitating a parallel development of national services providing access to national databases, in many cases yet to be created, as well as to international ones.

The development of a national information system serving research, in and out of universities, and post-graduate education in consistent with the higher education development plan its emphasis on inter-university centres. The strengthening of the better university libraries should aim at turning into inter-university libraries playing a major role in the national information system (UNESCO, 1985).
4.2 Library and Information Services

According to Martawardaja (1987) the starting point of the development of library and information services is in 1971. His statement based on National Workshop on The Organisation of Interlending and Document Supply held in 1971 and sponsored by the Scientific Information Documentation Centre. However, it does not necessarily mean that before 1971 there was no activity in the area of library and information services.

The infrastructure of the library and information sector in Indonesia is theoretically exist, compared to most of the developing countries. The Indonesian authorities are aware of the need for further refinement of the structure (UNESCO, 1985).

There is an agreement on the need for library development and substantial agreement on the nature of the problems to be faced. However, since the administration of programmes in library and information is in the hands of several administrative ministries, and also within the private sector. it is highly desirable, if such information policy be formulated, implemented and kept under review. There is an activity in specific policy aspects which relate to library development, such as computer network development, rule and guideline for librarian rank etc. Because of the lack of an overall policy statement is making planning more difficult. Therefore, there is a need for
coordinating body at the national level to draft a national information policy.

Until now, there is no detailed development plan for the national information system. However, the sporadic development of the libraries happen in some libraries. For example, the development of university libraries. The most contribution to library development for the university libraries is the appointment by the Director General of Higher Education of a Task Force for University Library Development (SATGAS or Satuan Tugas) in 1976 (Republic of Indonesia, 1987). It task is to review the general situation of university libraries, make recommendations and set guidelines for their development. Some guide lines has been produced by the Task Force such as:

1. General Guidelines of the University Library

2. General Guidelines on the Collection Development of the University Library

3. General Guidelines on Circulation and Reference Services of the University Library.

4. etc.

Furthermore, the concept of interlibrary loan was introduced in 1982. The implementation of this services faced difficulties due to the lack of budget and low reliability of the postal service.
The implementation of new technology seems as an urgent priority for progress and development, and the "SATGAS" is concerned to keep university libraries abreast of these developments. Its proposals to establish bibliographic centre and a library technology centre have been approved, and now those two centres have been very busy to implement the library development plan. All the programmes are intended to enhance the capacity and services of libraries in the state higher education sector in the context of the general development of universities and the centralisation and coordination of library development planning.

4.3 The Library Network in Indonesia

Library co-operation is important in the acquisition, organisation and dissemination. It is virtually impossible for any library, however great, to acquire all the retrospective material that is required for comprehensive coverage all subject fields or to keep up with the huge and rising tide of publication. Co-operation with libraries is therefore essential.

The idea of sharing resources and make them accessible for national use through a library and information network system are not new to the library profession in Indonesia. In Indonesia, library co-operative or information network, were established in 1971. There are four information network:
Science and technology, biology and agriculture, health and medical science, and social science and humanities. The centre of those network are, respectively, Scientific Information Documentation Centre (PDII) for science and technology; Central for Agriculture and Biology (PUSTAKA; formerly Bibliotheca Bogoriensis) for the biology and agriculture network; the Network for Health and Medical Science for health and medical science; and The National Library of Indonesia took responsibility for the social science and humanities (Pringgoeadisurjo, L. and Budihardjo, U., 1986; Martawardaya, 1987; Hernandono, 1990).

As the centre of science and technology, PDII has developed a close co-operation with many libraries and information centres, nationally and internationally. Since 1977, PDII has become the sole agent for all United State Technical Information Service (NTIS) publications. PDII is also a member of National Libraries and Documentation Centre-South East Asia (NLDG-SEA). Furthermore, PDII has been designed as a liaison office for the ASTINFO programme (Regional Network for the Exchange of Information and Experience in Science and Technology in Asia and the Pacific). Some publications which have been published by PDII such as Index of Indonesian Learned Periodicals (Indeks Majalah Ilmiah Indonesia), Index of Research and Survey Reports (Indeks Laporan Penelitian dan Survei), Catalogues, Bibliographies, Current Awareness tools, Directory of Special Libraries in
Information network for population and family planning was established in 1973-74. There are more than 800 participating libraries in Indonesia consisting of the branches of National Family Planning Coordination Board, the Indonesian Planned Parenthood Association, college and university libraries, research institute libraries and other agencies, private and governmental, which have collections of relevant material which they are willing to share. The network is also supported by a number of international agencies which fund some of its activities such conferences, seminars, workshops, training, surveys, consultancy etc. The network is open to public. Publications which are published by this network are: Catalogue of Audiovisual Aids (Media AVA), Index of Articles on Population and Family Planning, Bibliography on Population Planning Catalogue of non-published literature on Population and Family Planning.

The responsibility for the social sciences and humanities information network were took by the National Library of Indonesia. The National Library was formed by the integration of four libraries: The National Museum Library; The Political and Library of the Capital City of Jakarta; and the Bibliographical and Depository Division of the Centre for Library Development (Hardjoprakoso, 1987).
The information network for agriculture and biology is the responsibility of the Central Library for Agriculture and Biology. This library was built in 1842, the oldest library in Indonesia. It has a division of documentation, established to fulfil the library's role as a depository for agriculture and biology, and special division covering circulation and documentation and interlibrary co-operation. The library also provides a consultancy service, on the job training, centralised indexing, seminars, exhibitions etc.

Since 1988 it has been established library network among state university libraries. During the first term project (1988-1990) it has been chosen 14 state university libraries as the member of the network (Pusat Jaringan Kerjasama Perpustakaan Perguruan Tinggi, 1988). The criteria of the chosen library is that:

- the university library which is invited as a discipline service centre.

- the university which is already has post graduate program or post graduate studies.

- the university which has regional development centre.

- the university which is already has a computer network node for university network (UNINET).

This network will be developed in the future and will include all the state university libraries (45 state university). The first task of this
library network is creating union catalogue so that the information can be widely accessed by the users. The catalogue were created in the form of computer-based catalogue. For the early stage of the network, the bibliographic databases as well as computer-based catalogue were exchanged by using floppy disks, but in the future this communication will be held using electronic-based communication networks. The services given by the network are:

- shared cataloguing services
- bibliographic database services
- interlending and photocopy of the journal articles services
- information retrieval services.

Discipline Service Centres have been established to strengthen the collection as well as facilities. Each service centre acts as the primary sources of documents and information retrieval service for the whole members, in specific discipline service centres (Republic of Indonesia, 1987). Table 4.1 figures those discipline service centres.
<table>
<thead>
<tr>
<th>No</th>
<th>Discipline</th>
<th>Service Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Medical science</td>
<td>UNAIR</td>
</tr>
<tr>
<td>2</td>
<td>Technology</td>
<td>ITB</td>
</tr>
<tr>
<td>3</td>
<td>Computer, information, library science</td>
<td>UI</td>
</tr>
<tr>
<td>4</td>
<td>Marine science</td>
<td>ITS</td>
</tr>
<tr>
<td>5</td>
<td>Basic sciences</td>
<td>UGM</td>
</tr>
<tr>
<td>6</td>
<td>Agricultural science</td>
<td>IPB</td>
</tr>
<tr>
<td>7</td>
<td>Economics</td>
<td>UGM</td>
</tr>
<tr>
<td>8</td>
<td>Law</td>
<td>UI</td>
</tr>
<tr>
<td>9</td>
<td>Social Sciences</td>
<td>UGM</td>
</tr>
<tr>
<td>10</td>
<td>Languages and Humanities</td>
<td>UI</td>
</tr>
<tr>
<td>11</td>
<td>Art and Culture</td>
<td>ISI Yogyakarta</td>
</tr>
<tr>
<td>12</td>
<td>Education</td>
<td>IKIP Bandung</td>
</tr>
</tbody>
</table>

Table 4.1: The Discipline Service Centres in Indonesian University Libraries

4.4 Computer-Based Network Plan

In 1986 it has been launched a program of building an electronic or computer-based science and technology information network in Indonesia. This network is called IPTEKnet and intended to provide scientist, educator, research workers, and administrators with capability to electronically access science and technology information services made available at server nodes. This information can lead to the actual access of hardcopy material which may be needed (Luhukay, 1986). The interconnection of science and technology information server and user institutions will enable IPTEKnet to join participating node into logical network utilising the services of various available
physical network. Participating nodes consist of local-area-networks, single host-computer systems, and remote hookups by personal computer. Generally, a user interfacing to a computer network may want to perform any combination of the usual network functions, namely:

1. send/receive electronic mail;

2. transfer files, either down-loading or up-loading data;

3. submit a batch-job to a remote computer, in this case probably a query or search request;

4. interactively logon a remote server computer, and perform online processing (e.g. a search);

5. perform distributed processing by having the user computer interact automatically with the remote server computer.

In the university world, Indonesia has developed university network called UNInet. Originally this network was intended to provide a services of electronic mail to help promote communication among scientists. This network has an international gateway located in the University of Indonesia, Jakarta. Since 1988 the university libraries have taken part on this network services. Among 14 state university libraries which are members of the university library network, five have already had nodes, two have been mounting
(during the first period of the project 1988-1990) and the rest will be developed in the next period (Pusat Jaringan Kerjasama Perpustakaan Perguruan Tinggi, 1988).

4.5 Bogor Agricultural University Library

Bogor Agricultural University or Institut Pertanian Bogor (IPB) is one of the biggest universities in Indonesia. There are three purposes of the university, that is, education or instruction; research; and community services.

The library of Bogor Agricultural University was established to support those purposes. The library attempt to collect, store and disseminate science and technology information and to carry out documentation activities in the area of science and technology, including the report of the staff member of the IPB and theses/dissertations of the post graduate students.

IPB library is located in the city of Bogor, just about 60 km away from the capital city, Jakarta. It has its own four-storey building. The library activities itself occupies about 3/4 of the whole building of about 10,000 square meters. The rest is occupied by media information production centre.
As one of the government institution, IPB library has also been affected by an information technology revolution. The IPB library has applied computer technology since 1984, however this technology was applied only for administrative tasks in the early of application. Later development of the use of those kind of information technology by the library is that the library has used the computer technology for some kind of library housekeeping tasks such as acquisition and cataloguing. Recently, the library is equipped by at least ten microcomputers (personal computer), one of which is PC/AT with 40 megabytes hard disk.

In terms of staff development IPB library is categorized as slow in developing its staff. It could be mentioned that staff development in IPB Library has been started since 1979. Since this time some professional staff has been recruited. Before this period IPB library had been run by very poor staff. Only one professional staff had been employed in that period, and the rest of the staff were clerical staff. Now, the library has been enjoying a good condition in terms of employing a qualified staff. It has more than ten professional staff, four of which are taking high degree title in library and information studies.

The main user of the library are students and staff member of the university in the discipline of agricultural science in general, that is including veterinary medicine, fisheries, animal sciences, forestry, agricultural engineer-
ing including post harvest technology and food technology, and some pure science such as biology, physics, chemistry and mathematics. The number of potential user is about 12,603, this is including students, teaching staff and administrative staff (UKKP, 1990). Besides, the library also serves non university member students and academic staff member from another university as well as some researcher from some research stations in agricultural sciences which are scattered around the city of Bogor.

The main collection of the IPB library is the printed material, books and journal in the area of agricultural science and related subjects. It has about 43,826 of title of books, 1402 title of periodicals (UKKP, 1990). Besides, it also has thousands of brochures and pamphlets, thousands of reports and post graduate theses/dissertations, non-book materials such as microfilms, microfiches, slides, films, videos, audio cassettes etc.
Chapter 5

Online Public Access Catalogue

5.1 Introduction

Cataloguing is an important area in Library and Information Science. With the development of computer technology and its application in various library operations, attention has been given to switch over from manually operated traditional card catalogue to machine operated online catalogue. Some factors such as cost of maintenance, time required for its handling, limitations of access points etc. in traditional catalogue, reflect the picture of users dissatisfaction in the use of catalogue. Online catalogue, on the other hand, tries to overcome the difficulties faced by the users as well as by the library staff. Lots of libraries in developed countries and some in developing countries switch over to online catalogue and take the advantages of its speed,
low maintenance cost and potentiality for increasing the number of access point.

From the user's points of view the system offers some advantages such as:

1. easy to use,

2. faster than the card catalogue,

3. can be accessed from various approach points from terminals at different places.

The online catalogue is an exceptionally useful addition to library technology. It offers new way to search for information and the prospects are great that further refinement will improve the ability of library users to search large collection with ever improving precision.

Online catalogue provides computerised support for an intellectual activity that has traditionally performed manually. The qualities and characteristics by this intellectual activity have made online system training, continuing education, and evaluation of search particularly difficult and challenging task. It is left to the individual researches after their initial training for enhancing their quality of searching.
5.2 The Characteristics of OPACs

According to Mitev and others (1985) OPAC can be characterised, as being an Information Retrieval system, such as: (a) for users from widely varied backgrounds, (b) which need no intermediary, (c) whose record are not restricted to a single (or few) subject areas, and (d) its records are usually MARC or MARC-derived enriched only by controlled subject descriptors.

Moreover Mitev and others (1985) differentiate between OPACs and conventional Information Retrieval (IR) systems. OPAC is built up as a tool for references to bibliographic material in many subject areas, whereas traditional online or in-house reference retrieval systems usually cover one or a few narrower fields in which terms are less context-dependent, so that it is feasible to build a thesaurus. Furthermore, they added that the content of OPAC is usually limited to what is in MARC records. These records do not have abstracts, assigned indexing or controlled vocabulary is often poor or too broad, but there is some classification schemes, most commonly Dewey or Library of Congress.

Unlike a conventional online reference retrieval system, OPAC must be usable by people with widely varied backgrounds, without an intermediary. In other words, library users cannot be expected to know much about computers, catalogues or information retrieval techniques. The only suit-
able way in which users can be assisted is while they are actually using the OPAC, that is by the system itself (help messages, suggestive prompt, error message), and by instructional material in the form of leaflets or brief instruction sheets on display near the terminal.

From the economics point of view OPAC on LAN may be considered as an expensive technology for some developing countries. However, the more workstation attached to the LAN and use the OPAC, the less expensive those technology will be. Therefore, a connection of workstations throughout campus area should be taken into account in order to make this technology much cheaper in terms of economic value. A consideration to attach the server to outside university through the gateway needs to be thought. It is intended to make the OPAC accessible from outside the university. Accessing an OPAC through JANET in the UK is one of the examples of Local Area Network and Wide Area Network application. Through JANET the users can access an OPAC which is located in any university library from any workstation throughout the country.

5.3 Type of OPACs

Until early 1985 there are about fifty to a hundred distinct OPAC systems in use. Those OPAC are grouped into three categories such as: first generation,
second generation, and third generation (Mitev and others, 1985).

5.3.1 The First Generation of OPAC

The characteristic of the first generation of OPAC is that they use pre-coordinate indexing. The access point used is similar to those of hard copy catalogue such as author, title (phrase), class mark or call number, sometimes subject heading(s) - as a phrase. To access to the OPAC through title, users must input either a phrase (at least the beginning of it) or else a derived key. Most of this kind of OPAC are derived from circulation control systems, some from cataloguing systems, and some are merely designed as OPACs (Mitev and others, 1985).

5.3.2 The Second Generation of OPACs

The second generation of OPACs use post-coordinate. The access points of those OPACs are similar to those provided by traditional online reference retrieval systems, which use words from the free and controlled text as the access points. These OPACs differ from the reference retrieval systems in the nature of their records and in the mode of user interaction. The OPAC records being usually MARC or MARC-derived, do not have abstracts, nor do they have controlled indexing except sometimes for subject headings; These
access points are words from title-like fields, author and other names, and words from subjects headings when these are present (Hildreth, 1989; Mitov and others, 1985).

In contrast to the first generation systems, a search of keyword system retrieve a set of records, and sets may be empty, or unmanageable large. Although it could be said that the users can browse through the records in a retrieved set, this is very different from the way items are located by browsing in a phrase-indexed OPAC.

5.3.3 The Third Generation of OPACs

According to Hildreth (1989) the third generation would feature both phrase and keyword access. Their bibliographic records would be enriched by the inclusion of additional controlled and uncontrolled access points. They would accept search expressions in "ordinary language", provide context-dependent automatic help and guidance and degree of error-correction. They would combine some of the functions of reference librarian with those of a catalogue.
5.4 Advantages and Disadvantages

It was already mentioned that OPAC has some advantages over the conventional catalogues. Here are listed two of the principle advantages such as:

- OPAC can easily be made to provide a much greater range access points.

- Some OPAC has information of availability of the library material in the library and the possibility of making reservation of the library material.

Although it is not very clear, OPACs also have a number disadvantages such as:

- The ease of use tends to vary inversely with the sophistication of the functions provided. In one hand OPACs which are easy to use but ineffective, and on the other hand OPACs offering enhance access and sophisticated facilities which are not taken advantage of by most users (Mitev and others, 1985).
Chapter 6

The CDS/ISIS Software Package

6.1 The Feature of the Software

The mini-micro version CDS/ISIS (Computerised Documentation System/Integrated Set of Information System), was developed by the Division of UNESCO Library, Archive and Documentation Services. It is a generalized textual information storage and retrieval system designed for use on an IBM or IBM-compatible microcomputers. The first version was released in 1985 (Chaudhry, 1989). The original package run on the IBM mainframe and was developed for ILO. The software has been designed in co-operation with the Division of the General Information Programme (PGI) and has been compatible with standards like ISO 2709. It has also been designed to produce
output compatible the requirements of any MARC format and is capable of being host to a database form according to the UNESCO CCF.

CDS/ISIS is a menu driven Information Storage and Retrieval System designed for the computerised management of information storage and retrieval system specifically for the handling of structured, non-numerical databases. It becomes popular and faster acceptance over the world, especially in the developing countries because it has a good features; bearing credible institution’s maintenance and development support; and this is the most important reason, CDS/ISIS is distributed free-of-charge to all non profit making institutions in the developing countries by UNESCO. The software is distributed through regional or national agencies designated for the purpose. Where such an agency is not available, the program can be obtained directly from UNESCO. The institution has to sign an agreement with UNESCO for the licence to use the software (Chaudhry, 1989; UNESCO, 1989; Chaudhury and Shukla, 1988; Gallina and others 1989).

The users communicate with the software through menu, prompts and worksheets. It allows the user to define a database that consists of data elements; to enter new records into the databases; to correct or edit existing record as well as existing database definition; automatically build and maintain and access file to each database; to retrieve the records using sophisticated search facility that is based on boolean operator, field level and
proximity search operator; to display the records; to sort and print partial or full records following the user's own specification through the format defined.

6.2 The Function of The CDS/ISIS

CDS/ISIS, according to version 2.3 CDS/ISIS user manual, is a set of computer programs that is designed to be used in a variety of function related to information storage and retrieval system. It has been mentioned above that the software allows the user to:

- creating data bases containing the required data element,
- entering record into the database,
- editing record and/or data bases structure such as modifying correcting or deleting the existing records and/or data base definition table (data base structure),
- creating and maintaining index files (inverted file) to facilitate fast access to the records within each database, to maximize retrieval speed.
- Retrieving records by their contents, through a sophisticated search language.
- displaying the records according to the requirement.
- sorting the records according to the user's need.

- printing partial or full catalogues and/or indexes.

- develop specialized applications using the CDS/ISIS integrated programming facility.

Those facilities are grouped into two major programs comprising four programs each. Those two major programs are the "user programs services" and the "system programs services".

6.2.1 The User Program Services

The major function of the user program services is to operate the existing databases. This program only requires a basic operational knowledge of CDS/ISIS. The user programs consist of:

- ISISENT - for data entry and record editing

- ISISRET - for information retrieval

- ISISPRT - for production of printed output such as catalogues and indexes.

- ISISINV - for inverted file maintenance and utility functions.
1. ISISENT - Data Entry Services.

The ISISENT services provide facility related to data entry and record editing. Using this program the user can add record, modify or edit the existing record or deleting the existing records. This program operates on the database definition services. For repetition of the content of one or more fields this program provides a facility of pre-define the content of the fields such as series or journal title. This allows the user to input the content of the fields once and this data will be automatically added to all subsequent records.

2. ISISRET - Information Retrieval Services

This program provides and perform all function related to information retrieval. It allows the user to search for information and retrieve it. It also provides facility to display the dictionary of the search terms and use it as a help in performing search formulations. The user can use this program to display the search result using pre-define output formats.


This program allows the user to produce printed output of search result that has been previously saved using ISISRET. It also allows the user to produce printed catalogues and/ or indexes.
4. ISISINV - Inverted File Services.

This program provides facility to create and maintain the inverted files. Using this program the user can create, update, back up, restore and print the inverted files. MICRO CDS/ISIS retrieval is accomplished by this inverted file. The inverted file consists of searchable terms that are created by the system according to "pre-defined" command created by the user when he/she defines the Field Select Table (FST). For searchable terms, it creates a link through the inverted file, which contains record master file number (MPN) and field numbers of the records in which the corresponding search element will be found.

6.2.2 The System Program

This is the second part of the group of CDS/ISIS programs. These group of programs provide a wide range of the function, which allow the user to define databases in a way that no programming is needed. Unlike the user programming, the user who runs this program assumed that he/she has an in-depth technical knowledge of system components, up to familiarity with computer programming, whereas for the user program he/she only requires a basic operational knowledge. There are three major programs, which facilitate creation and maintenance of databases plus one advanced program.
facility, called ISISPAS, to allow the user to develop the application program and integrate them with CDS/ISIS.

Those three programs are:

- **ISISDEF** - for definition of new databases and/or modification of existing database definition.
- **ISISUTL** - for miscellaneous system utility function.
- **ISISXCH** - facilities for interchanging data with other systems and master file utility.

1. **ISISDEF - Database Definition Services**

This program provides facility to define new databases as well as to modify existing database definitions. Database creation in this program involves the creation of: Field Definition Table (FDT), which is defined the fields of the master record for the database; Data Entry Worksheet(s) means creating one or more screen layout used to create and/or update the master records of the databases; Field Select Table (FST), which define the fields to be made searchable through the inverted file; and Display format(s), which define precise formatting requirements for both online display of records during searching and
for the generation of printed output products such as catalogues and indexes.

2. ISISUTL - System Utility Services

This program provides miscellaneous system utility function, which allows the user to create and edit menus and worksheets; print menus and worksheets; define or modify screen attributes; and print system message files. This program is very useful for the user of the CDS/ISIS in the non-English speaking countries because there is facility to translate the menus, worksheets and screen attribute into the local language. These functions enable the database manager as a user of CDS/ISIS to customize the systems as well as control the system operation.

3. ISISXCH - Master File Services

The program provides facilities to allow the user creating master file back up and restore as well as importing and exporting the data for interchanging data with other systems, including mainframe computer. It is very useful for simple library networking, which is the use of telecommunication line has not been applied. The member of the library simply sends the data using floppy diskettes to be merged in the centre of the network.

The exchange facilities are made possible via ISO 2709, which is an
integral part of CDS/ISIS. Through ISO 2709 the package can support databases, which produce output in accordance with the requirement of any MARC format and UNESCO Common Communication Format.

6.3 Format for Data Interchange

There are some problems faced by most of the developing countries such as the limited resources due to financial constrain. One of the alternatives to solve this problem is by forming library co-operative for resource sharing cataloguing data as well as resources at local, national and even international level. If two or more libraries or information unit want to exchange records with one another, it will be necessary for each unit or organisations to agree upon standard format for exchange purposes. Each must be able to convert to an exchange-format record from an internal format record, and vice versa (Simmon and Hopkinson, 1988). The advanced level of national and international data interchange has been facilitated by the use of internationally accepted standards for processing data and formats exchanging it.

Exchange format is intended for the exchange of records between the systems. According to Gredley and Hopkinson (1990) the complete success of an international data exchange depends on the acceptance of the standards for record construction and the availability of records in machine readable
form. Furthermore, he pointed out:

"They must be acceptable to the exchanging agencies; hospitable to the types of materials which are the subject of the records being exchanged; and sufficiently flexible to cope with the needs of many different software systems. Ideally, they should facilitate the exchange of data which are to be used in a wide range of different bibliographic applications, from the production of traditional catalogue card to records in databases which are used for online access."

There are some data exchange format used in the world. One of the most popular and widely used, with some adjustment of course, is MARC, such as USMARC, UKMARC, UNIMARC, MALMARC, INDOMARC, etc. ISO 2709 is the international standard format for bibliographic information interchange on magnetic tape was developed from the record structure of LC MARC which is intended to use for exchange of bibliographic records on magnetic tape.

Every country has its own information requirements and language. It is different between one country to another. Therefore they need different format for their national databases. At present time, many countries create their own format, generally based on MARC, for supporting their network with worldwide to exchange and share bibliographic record in MARC format using the national MARC standards (Gredley and Hopkinson, 1990). Although some of these formats are very similar to one another, some formats are very different. It is very rare to find, if any, two national formats so com-
pletely same so their records can be handled by the same computer programs (Simmon and Hopkinson, 1988). Different national standards are inevitable as different libraries require different levels of record description to suit their local needs. Those small differences do not hinder data exchange as records can be made compatible after conversion.

UNIMARC is the Standard International MARC network exchange format. Unimarc is used for exchanging data between different national format. UNIMARC was published in 1977 and the second edition for this format was published in 1980 (Gredley and Hopkinson, 1990).

Another format for data exchange which is used internationally is common communication format (CCF) from UNESCO. The CCF is designed to provide a standard format for three major purposes (Simmon and Hopkinson, 1988). Those three purposes are:

- To permit the exchange of bibliographic records between group of libraries and abstracting and indexing services.

- To permit a bibliographic agency to use a single set of computer programs to manipulate bibliographic records received from both libraries and abstracting and indexing services.

- To serve as the basis of a format for an agency's own bibliographic databases, by providing a list of useful data elements. To assist the
development of individual systems, other UNESCO documentation will provide implementation notes for the CCF, and a guide for AACR2 cataloguer who use the CCF.

The first version of CCF was published in 1984, and the second version in 1988. It uses the latest version of the ISO 2709 standard. This format was published specifically as an exchange format for organisation in developing countries (Gredley and Hopkinson, 1990).

6.4 ISO 2709 Format

The ISO 2709 record consists of three logical segments such as:

- Leader.

  This consists of fixed length elements which provide control information to the processing program.

- Directory.

  This consists of variable number of fixed length entries, each giving the identification, length and location of each variable field in the record. It ends with a field separator. The length of directory entry is defined in the directory map fields in the leader segment (offset 20 and 21).
• Data Fields.

The data is in the form of variable field ends with a field separator.

The leader and directory are two control segments which are used to process data contained in the third segment. Since each record in the file is of variable length, no excess space is required to store the file. The following table (Table 6.1) figures the element of ISO 2079 leader.

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5</td>
<td>Record length</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Record status</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Implementation codes</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>Indicator length</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>Subfield identifier length</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
<td>Base address of data</td>
</tr>
<tr>
<td>17</td>
<td>3</td>
<td>For user systems</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>Length of &quot;length of entry&quot; fields</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>Length of starting character position</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>For future use</td>
</tr>
</tbody>
</table>

Table 6.1: The element of ISO 2079 Leader
Chapter 7

The Database Creation

The major step of developing a computer-based bibliographic database using MICRO CDS/ISIS may be divided into three main phase such as:

- Planning
- Installing the system
- Database creation

7.1 Planning

This stage involves stating the objective and software selection.
7.1.1 Objective

The pilot study of the creation of Online Public Access Catalogue for Bogor Agricultural University Library (IPB Library) has the following aim and objectives:

- To provide fast and wide access into the IPB Library's collection.
- To facilitate current and retrospective searches.
- To facilitate information exchange on the form of machine readable form with national and international organisation with special emphasised to sharing databases among the Indonesian University Libraries.
- To produce printed catalogue (it may be as book catalogue or card catalogue) as an emergency catalogues.

7.1.2 Software Selection

Software packages suitable for management and retrieval of bibliographic information are now available on the market. According to UNESCO's survey, which is quoted by Lohner and Koch (1985), there are more than 150 software packages available on the market. This survey provides comparative
information on technical characteristics, hardware compatibility, and function, as well as other factors such as cost, users and support services. A few packages of general utility can be obtained under interesting conditions for use in the developing countries.

Due to some constraint in applying library automation especially economic and manpower factors, there are very few developing countries can apply such software in their library. Some libraries tried to create in-house software for their catalogues as well as their bibliographic databases. For example, in 1985/1986 Bogor Agricultural University Library has created its own program for its bibliographic database and online public access catalogue. The project was funded by USAID and carried out by employing external staff. Because of the lack of trained staff and the budget the library could not maintain the software after the project finished, and it became out-of-date. Now the Library is trying to apply Micro CDS/ISIS.

Micro CDS/ISIS has considerable advantages to be used as an alternative software package in building Online Public Access Catalogue as well as bibliographic databases in developing countries such as Indonesia. One of the most appropriate reasons in choosing Micro CDS/ISIS as an alternative software for developing countries is that, this software can be obtained free-of-charge from UNESCO (Gallina and others, 1989). Apart from hardware cost most libraries in the developing countries can afford their library automation
programme. Besides, some relevant reasons of choosing Micro CDS/ISIS as a software package for library housekeeping tasks can be mentioned as follows:

1. It provides a sophisticated online input, data management and retrieval facilities appropriate for the efficient handling of relatively large bibliographic database. It is mentioned in the CDS/ISIS manual that CDS/ISIS has the following feature:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of databases</td>
<td>unlimited</td>
</tr>
<tr>
<td>Maximum number of records in a database</td>
<td>16 millions (within the limit of 500 Mb)</td>
</tr>
<tr>
<td>Maximum record size</td>
<td>8000 characters</td>
</tr>
<tr>
<td>Maximum number of fields</td>
<td>200 (excluding repetitions of repeatable fields)</td>
</tr>
<tr>
<td>Maximum number of FST line</td>
<td>200</td>
</tr>
<tr>
<td>Maximum field size</td>
<td>8000 characters</td>
</tr>
<tr>
<td>Maximum number of fields in a worksheet page</td>
<td>19</td>
</tr>
<tr>
<td>Maximum number of pages in a worksheet</td>
<td>20</td>
</tr>
<tr>
<td>Maximum size of a display format</td>
<td>4000 characters</td>
</tr>
<tr>
<td>Maximum number of stopwords</td>
<td>799</td>
</tr>
</tbody>
</table>

2. It provides a fairly high degree of the user friendliness such as:

- clear menus;
• clear error messages;

• help facilities;

• search term transaction for helping user in consulting the database; and

• possibility for multilingual commands.

Relating to the user friendliness of the Micro CDS/ISIS, one such as database manager or a librarian can use Micro CDS/ISIS easily. In other words, it does not necessarily need to be a computer expert or one with some programming knowledge in using Micro CDS/ISIS. The availability of the help message key (F1), which the user can call on any time during data entry proved to be an indispensable tool for a beginner user of CDS/ISIS.

3. High degree of compatibility.

This software is known to run on number of IBM compatible machines such as:

• IBM PS/2 (under MS DOS)

• Olivetti M2x

• Compaq 286 and 386

• Bull Micral 30

• Goupil III, IV, V
- Amstrad PC 1512
- Philips PC
- Commodore PC 10, PC 20
- Hewlett Packard HP-Vectra.

A special version is also available for Wang-PCs working after the native MS-DOS operating system. The minicomputer version is currently available for the VAX series (including micro VAX) produced by Digital Equipment Corporation, operating under the VAX/VMS operating system.

4. It is provided by a sophisticated text retrieval facility.

Micro CDS/ISIS is a generalised storage and retrieval software. It has characteristics of Data Base Management System. However, since CDS/ISIS was created for handling non-numerical databases, that is textual databases, it is facilitated by sophisticated text retrieval facilities. It differs from Data Bases Management System, which supports database creation and maintenance but offers less sophisticated retrieval possibilities. Micro CDS/ISIS undertakes the initial tasks of DBMS and carries the latter (retrieval abilities) to the level that most text retrieval packages do.
5. It is supported by advanced programming facilities, which allow the user to develop his/her own application program and integrate them with CDS/ISIS.

6. It is supported by training for the user of the software from UNESCO. For example, such training has been conducted in Indonesia. The training were conducted and sponsored by UNESCO.

7. It provides a sample database.

The software consists of a sample database CDS. It is very useful to a user who wants to know the CDS/ISIS work. The sample is provided to be browsed through and to be seen how complete the database set up in Micro CDS/ISIS.

8. Micro CDS/ISIS provides a good data security check.

The data base manager can set up the system in such away that unauthorised cataloguers, indexers, and other possible users cannot delete the records once entered and confirmed. This is done through the system utilities function. Micro CDS/ISIS provides a facility where a record deleted by mistake can be restored where it asks a user to confirm the act of deletion. Even at the level of confirming the deletion Micro CDS/ISIS deletes it temporarily in that it keeps it flagged as deleted. Total deletion can only be done via the master file services by the database manager.
Furthermore, according to Goyal and Kumar (1990) the CDS/ISIS as an Information Retrieval (IR) package group has some advantages over Database Management System (DBMS) package. Here are some features of the CDS/ISIS compare to DBASE/foxBASE:

1. In CDS/ISIS record are stored in compact form, whereas in dBase/foxBase, records are padded with blanks if the contents of the fields are less than the field length. This compact format of CDS/ISIS minimises the storage on the disc.

2. In CDS/ISIS, the capability to handle repeatable fields is useful in organising the bibliographic databases where multiple authors and multilingual titles occur quite frequently. This feature is not available in dBase/foxBase.

3. CDS/ISIS can handle subfields within a field, which helps in storing the logically related data in different subfields of the same field. DBase/foxBase does not support this feature.

4. CDS/ISIS provides a high level language PASCAL interface to develop advanced CDS/ISIS applications, whilst dBase/foxBase has a set of commands to develop applications which are equally good.

5. CDS/ISIS provides four type of indexing techniques (0 - whole word, 1 - subfield, 2 and 3 - selective word, and 4 - each word) whereas in
dBase/foxBase indexing can only be performed on the first word of an index field.

7.2 Installing the CDS/ISIS

Although CDS/ISIS can be run in a single sub-directory or root directory, in order to have a good file organisation it is a good idea to put the file in separate sub-directory. For this reason, information placed on the harddisk or even on the floppy disk must be logically organized, and the method of the organisation must be easy to understand. Therefore installing CDS/ISIS can be describe as follows:

1. First step is creating sub-directory for file organisation.

   \texttt{A:\ISIS\SYS} for the system files
   \texttt{A:\ISIS\PROG} for the program files
   \texttt{A:\ISIS\MENU} for the format menu file
   \texttt{A:\ISIS\MSG} for the message files
   \texttt{A:\ISIS\DATA} or whatever the name and sub-directory for the data files.

2. The second step is creating system parameter in the working directory to tell the system so that the computer read the correct sub-directory
when it is needed. The system parameter, SYSPAR.PAR, can be created using DOS line editor or any wordprocessing which can produce ASCII text and consist of:

1=A:\ISIS\PROG\  
2=A:\ISIS\MENU\  
3=A:\ISIS\MSG\  
4=A:\ISIS\  
5=A:\ISIS\DATA\  
6=IPB  
7=E

or if the CDS/ISIS is installed in the harddisk on drive C: the SYSPAR.PAR will be:

1=C:\ISIS\PROG\  
2=C:\ISIS\MENU\  
3=C:\ISIS\MSG\  
4=C:\ISIS\  
5=C:\ISIS\DATA\  
6=IPB  
7=E

It is also possible to put the option to use the working path or subdirectory for the data such as:

1=A:\ISIS\PROG\  
2=A:\ISIS\MENU\  
3=A:\ISIS\MSG\  
0=? please enter your working path..............

OR

1=C:\ISIS\PROG\  
2=C:\ISIS\MENU\  

71
3=C:\ISIS\MSG\n0=? please enter your working path...............

then create the parameter for directory option such as:

4=A:\ISIS\
5=A:\ISIS\DATA\OPAC\n
or

4=C:\ISIS\
5=C:\ISIS\DATA\OPAC\n
or

4=D:\
5=D:\DATA\OPAC\n
or whatever directory or subdirectory.

3. Creating batch file for the path to tell the computer where the ISIS.EXE is, such as:

`AISIS.BAT  consist of
PATH=A:\ISIS;A:\ISIS\SYS

or
PATH=C:\;C:\ISIS\SYS`

Alternatively, PATH can be added to the AUTOEXEC.BAT by modifying it using line editor and adding C:\ISIS\SYS. If the computer has an automenu it is also advisable to adding CDS/ISIS as one of the menu selection.
7.3 Database Design

This phase involves:

- Field selection from INDOMARC
- Data item definition
- Data entry worksheet(s) creation
- Indexing technique(s) definition
- Display and print format definition

7.3.1 Field Selection

To be able to do record exchange among the university libraries in the future, the database file (called IPB) uses INDOMARC format in its field creation. The selection of fields from the INDOMARC record is made based on some reasons. Each record has to have as many as access point as possible. IPB needs to be able to display record suitably, but could not afford to waste disc space by holding unnecessary fields, or by duplicating information already held elsewhere in the record. The record format has to be much simpler than either INDOMARC or MARC format in order to save code as well as space. The OPAC is designed to give enough information to be acceptable.
to staff and students accustomed to the card catalogue. In other words IPB
is designed to be brief and simple but fairly comprehensive.

The IPB record uses data format from INDOMARC such as the fol-
lowing table (Table 7.1).

<table>
<thead>
<tr>
<th>Tag</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>Local control number</td>
</tr>
<tr>
<td>020</td>
<td>ISBN (other control number)</td>
</tr>
<tr>
<td>041</td>
<td>Language code</td>
</tr>
<tr>
<td>080</td>
<td>UDC number</td>
</tr>
<tr>
<td>099</td>
<td>Location information (Call number)</td>
</tr>
<tr>
<td>100,110,111</td>
<td>Author (main heading)</td>
</tr>
<tr>
<td>240 or 245</td>
<td>Title</td>
</tr>
<tr>
<td>250</td>
<td>Edition</td>
</tr>
<tr>
<td>260</td>
<td>Imprint</td>
</tr>
<tr>
<td>300</td>
<td>Physical description</td>
</tr>
<tr>
<td>440, 490</td>
<td>Serial statement</td>
</tr>
<tr>
<td>500</td>
<td>Note</td>
</tr>
<tr>
<td>600,610,611</td>
<td>Name subject heading</td>
</tr>
<tr>
<td>650,651</td>
<td>Subject heading</td>
</tr>
<tr>
<td>700,710,711</td>
<td>Added name</td>
</tr>
<tr>
<td>850</td>
<td>Holder</td>
</tr>
</tbody>
</table>

Table 7.1: The Data Format of IPB Online Public Access Catalogue

7.3.2 Database Structure Definition

The data items are defined/modified by using ISISDEF or Database defi-
nition services from the main menu. The field definition table (FDT) or
data structure consists of Tag, Name, Length, Type, Repeatability, and Delimiters. This information is used by data entry program to structure and validate the data into the record. Appendix 1 figures the FDT for IPB database.

### 7.3.3 Data Entry Worksheet(s) Creation

This worksheet(s) are used to enter and modify database records. The worksheet(s) creation is the second step after data item definition. It also uses ISISDEF or database definition service from the main menu. A worksheet(s) consists of a set of one or more fields, which have been defined in FDT. Each field must provide a number of parameters such as tag number, position (line and column), field value, field attribute, field length, field type, field pattern, help message and default value. Every database may have more than one worksheet. Appendix 2 figures the worksheets of IPB database.

### 7.3.4 Indexing Technique(s) Definition

To retrieve records by the various access points, it is necessary to create inverted file by using appropriate indexing technique(s). A Field Select Table (FST) defines a criterion for extracting one or more data items from a master file. FST is also defined using ISISDEF from the main menu and consists of
items such as a field identifier (i.e. tag number of field), an indexing technique, and a format. These elements are then used to create inverted file entries for the record for which they are extracted or for sorting the records into the desired sequence before producing a printed report. The indexing technique of IPB database is presented in appendix 3.

7.3.5 Display and Print Format Definition

The display and print format(s) allows one to display or print output of a given query and/ or print a range of records selected by MPN (Master File Number). This format can be defined using ISISDEF from the main menu. One database can have more than one output/ display format. Appendix 4 figures the display format of OPAC used by IPB database.

7.4 Transfer Data to CDS/ISIS Database

One problem for implementing CDS/ISIS in Indonesian libraries is that some university libraries have been using another software to building up their database. For example Bogor Agricultural University library has already input in about 15,000 records into its database using DBASE software.
The transfer of software create problems in which the library has to
decided either re-input the existing record or just left the previous database
using the existing software and create the new one using CDS/ISIS. The first
alternative is not realistic because it is not only very expensive but also waste
the time to do duplication of data entry. The second alternative also creates
problem to the user, because users have to learn two systems in accessing
the library's collection. Another alternative is that the library must create
an interface program to transfer the records from DBASE database into the
interchange format ISO 2709 so that the record can be imported into the
CDS/ISIS database.

In this study, interface program, DBTOISIS, was created using PAS-
CAL language. This sample program converts the ASCII text file produced
by DBASE software into the ISO 2709 interchange format. The DBASE
database, in this study, consists of four field such as TITLE, AUTHOR,
DATA OF PUBLICATION, and INDEX. The first step is converting the
DBASE record into the ASCII text file. It can be done by using the DBASE
report form and printed into the file instead of to the printer. In the ASCII
text file each field occupies one line. The following example (Table 7.2) gives
format of ASCII text file.
<table>
<thead>
<tr>
<th>Line</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exchanging bibliographic data: MARC and other international format</td>
</tr>
<tr>
<td>2</td>
<td>Greadley, E</td>
</tr>
<tr>
<td>3</td>
<td>London: Library Association, 1990</td>
</tr>
<tr>
<td>4</td>
<td>Standard format; Communication format</td>
</tr>
</tbody>
</table>

Table 7.2: The Record in ASCII Text File

After running DBTOISIS program the record will be converted into the following format:

```
00229000000000000730004500245006900000100001200000250003500081660003900016#
Exchanging Bibliographic Data: MARC and other international format.#Greadley, E.#London;
Library Association, 1990.#Standard Format; Communication Format.##
```

Where the record consists of Header and data field. Header consists of (a) Leader and (b) Directory. The following table (Table 7.3) figures the format of the record.

The data field is written directly after the header and follows the value of the directory of the header. The header and the data field is separated by hash (#). Hash is also used as field separator as well as record separator.

This program can be used not only for converting the record format from DBASE database into the ISO 2709 format but also the record produced by any software, as long as the software can produce ASCII text file. The source code program DBTOISIS is given in appendix 5.
<table>
<thead>
<tr>
<th>Part of Header</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00229</td>
<td>Record length</td>
</tr>
<tr>
<td>0</td>
<td>Record status</td>
</tr>
<tr>
<td>0000</td>
<td>Implementation codes</td>
</tr>
<tr>
<td>0</td>
<td>Indicator length</td>
</tr>
<tr>
<td>0</td>
<td>Subfield identifier length</td>
</tr>
<tr>
<td>00073</td>
<td>Base address of data</td>
</tr>
<tr>
<td>000</td>
<td>For user system</td>
</tr>
<tr>
<td>4</td>
<td>Length of &quot;length of entry&quot; field</td>
</tr>
<tr>
<td>5</td>
<td>Length of starting character position</td>
</tr>
<tr>
<td>00</td>
<td>For future use</td>
</tr>
<tr>
<td>245</td>
<td>Field tag (245 = title)</td>
</tr>
<tr>
<td>0069</td>
<td>Field length (title length)</td>
</tr>
<tr>
<td>00000</td>
<td>Starting character position for title</td>
</tr>
<tr>
<td>100</td>
<td>Field tag (100 = author)</td>
</tr>
<tr>
<td>0012</td>
<td>Field length (author length)</td>
</tr>
<tr>
<td>000069</td>
<td>Starting character position for author</td>
</tr>
<tr>
<td>250</td>
<td>Field tag (250 = publication statement)</td>
</tr>
<tr>
<td>0035</td>
<td>Field length (publication statement length)</td>
</tr>
<tr>
<td>00081</td>
<td>Starting character position for title</td>
</tr>
<tr>
<td>650</td>
<td>Field tag (650 = index)</td>
</tr>
<tr>
<td>0039</td>
<td>Field length (index length)</td>
</tr>
<tr>
<td>00116</td>
<td>Starting character position for index</td>
</tr>
</tbody>
</table>

Table 7.3: Record format according to ISO 2709 record format
7.5 Data Transfer from CD-ROM

CD-ROM has proved to be so interesting a new technology recently. This is because of its capability to store a large number of information. There is an increasing range of CD-ROM products which contain large numbers of bibliographic records, useful to libraries as a source of cataloguing data. A MARC records database on CD, Library Corporation’s BiblioFile for example is now ready for use. Libraries can access these records, download into their own database and edit the records to their own requirements then utilize them for their own system (Dodson, 1987; Wright, 1990). Furthermore, Wright mentioned:

"Developing countries are not likely to achieve the same 'hit' rate as the developed world, but the cost of acquiring these records is likely to be less than local record creation."

With a little modification DBTOISIS interface program can be used to modify the ASCII text files, files produced by downloading process from CD-ROM databases, to the ISO 2709 record format, so that the records can be imported into the CDS/ISIS databases.

Although the technical ability to download bibliographic data obviously exists, some aspects, including the copyright, should be taken into account. According to the Copyright Act of 1956, eight classes of material are protected. These are literary, dramatic, musical and artistic works, sound
recording, films, broadcasts and typographical layouts. Although databases are not mentioned as such in the act, it seems likely that databases qualify for protection as literary works (Crabb, 1986). That is why the application of importing the records from CD-ROM should refer to copyright act.

7.6 CDS/ISIS on Local Area Network

One of the purposes of this study is to examine the possibility of application of CDS/ISIS on Local Area Network, so that many users can access the database file or OPAC file from file server simultaneously.

Library automation for some libraries in the developing countries was started by using PC Junior and gradually increased to PC XT with 512 K or 640 K. When later on the library can afford to buy PC AT with 1 MB RAM and considerable high disk storage capacity, the previous machines still can be used together with the latest machines. In this situation, the application of Local Area Network is the alternative to be chosen. With LAN technology those machines can be connected to each other where the PCs can be used as terminal (work station) and the AT as file server. The minimum requirement for the terminal to be used as a terminal in this case is that the machine should have at least 512 K RAM for running the CDS/ISIS. Although PC/XT with processor 8086 can be used as a workstation, it is

81
highly recommended to use PC/AT with processor at least 80286, especially for accessing a very big database. With 80386 or even better 80486 the access time will be faster.

Based on that idea, this study tried to use the CDS/ISIS on Local Area Network environment. Accessing the CDS/ISIS database which is stored in the file server from any workstation was examined. CDS/ISIS version 2.32 (micro version) as an information retrieval software and Novell Netware as LAN manager was used in this study, whereas the hardware is VIG III/33 mHz HD80M+TTL Amber 386 with 600 mB Harddisk for the server and VIG SLI 286 as workstations. In order to make more user friendly, the Novell Menu System V1.22 was used to facilitate the users with the full menu system. The following is the step of installing the database and the CDS/ISIS software into the file server.

1. Using the supervisor facility (utility program from network software, in this case Novell Netware) the CDS/ISIS and the database is stored under the sub-directory PUBLIC and sub-sub-directory CDS such as:

F:\PUBLIC\CDS\SYS for the ISIS.EXE, DEVOVL.OVL, PASOVL.OVL
F:\PUBLIC\CDS\PROG for all application programs files
F:\PUBLIC\CDS\MENU for all menu files
F:\PUBLIC\CDS\MSG for all message files
F:\PUBLIC\CDS\DATA for all database files
For the database security reason the attribute of the database file as well as program files is modified to Shareable Read Only so that only the supervisor can change the database, such as adding, editing, or deleting the record.

2. Preparing the system parameter

It is recommended that the system parameter is placed in the directory where the ISIS.EXE is placed. For example the following SYSPAR.PAR, is this study, is written in the sub-directory

F:\PUBLIC\CDS\SYS.

The content of the SYSPAR.PAR is:

1=F:\PUBLIC\CDS\PROG\n2=F:\PUBLIC\CDS\MENU\n3=F:\PUBLIC\CDS\MSG\n4=F:\PUBLIC\CDS\DATA\n6=IPB (or whatever the database filename)
7=E (for English language version)

3. Preparing an automenu to facilitate the users an easy access to the database. Novell Menu System V1.22 is used for this purpose. It can also use AUTOMENU version 4.0 from Magee Enterprises. This study uses Novell Menu System V1.22 for the LAN version and AUTOMENU version 4.0 for PC (singleuser) version.
Chapter 8

Conclusion and Recommendation

8.1 Conclusion

Having discussed the feature of the CDS/ISIS, and based on the experiment on the use of CDS/ISIS, it can be concluded that the CDS/ISIS can be used as an appropriate software package for building an Online Public Access catalogue as well as bibliographic databases in Indonesian University Libraries, at least at the Bogor Agricultural University because:

1. The structure of the Micro CDS/ISIS database was found flexible enough to accommodate the various data element needed by local requirement, in this case the record structure is built according to INDOMARC.
2. It was found very useful as it can accommodate a structure which conforms to the international standards such as ISO 2709 which would greatly facilitate data exchange with other information centres and libraries.

3. It was found that the CDS/ISIS database can import records from other databases created using other software as long as those records are written in ASCII-text and in the record format of ISO 2709. Interface program to convert record format into the ISO 2709 record format can be created.

4. Micro CDS/ISIS can be obtained free-of-charge from UNESCO. It can make some libraries in developing countries such as Indonesia can afford their library automation programme.

5. Relating to the user friendliness of the Micro CDS/ISIS, it is no need programming knowledge to employ this software.

6. In terms of compatibility, Micro CDS/ISIS has fairly high degree of compatibility. It is very important since every library has its own decision in acquiring the computer hardware.

7. In terms of retrieval ability, Micro CDS/ISIS is provided by a sophisticated text retrieval facility. The retrieval facility based on boolean operators, field level and proximity search operators. It allows the user
retrieve the records using author(s), title or part of the title, keyword(s) and the combination of those terms. It is also possible to browse the index file and retrieve the record using the searchable terms in the index file.

8. The database maintenance was found to be very flexible and easy to understand. The system messages are provided for adding, editing and deleting record. It also allows to make back up of database record onto other files as well as other media such as floppy disk. It also gives possibility to exchange the data using the ISISXCH - mater file services by exporting the record.

9. It provides a good data security check. It is very important since not everyone has an ability to operate the software. In the case of accident of deleting the record, the software still gives an opportunity to recover the record deleted.

10. It was found that CDS/ISIS can be run in the Local Area Network environment. This capability is very important for the application of the CDS/ISIS for Online Public Access Catalogue.
8.2 Recommendation

Although CDS/ISIS can be run in a single subdirectory, it is recommended to run this software in multiple directory. This is intended to maximize the performance of the software.

Secondly, although this software can be run in PC/XT with 8086 processor, and minimum RAM is 512 K, it is highly recommended to run this software in a bigger machine such as PC/AT 80286 or 80386 or even 80486, especially when this software is used in Local Area Network environment. This is intended to make faster process in accessing the records.

Finally, further study on the use of this software is very important to improve its performance. In order to make it more user-friendly during information retrieval, it is very important to create help facility interface. Furthermore, interface for running the circulation control together with an OPAC could be created to make it useful as an OPAC as well as a circulation control.
Bibliography


APPENDICES
1. The FDT of IPB database

<table>
<thead>
<tr>
<th>Tag</th>
<th>Name</th>
<th>Length</th>
<th>Type</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Control Number</td>
<td>25</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>ISBN</td>
<td>50</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Language Code</td>
<td>30</td>
<td>X</td>
<td>abc</td>
</tr>
<tr>
<td>80</td>
<td>UDC Number</td>
<td>50</td>
<td>X</td>
<td>abc</td>
</tr>
<tr>
<td>99</td>
<td>Local Number</td>
<td>50</td>
<td>X</td>
<td>abc</td>
</tr>
<tr>
<td>100</td>
<td>Personal Name</td>
<td>100</td>
<td>X</td>
<td>abc</td>
</tr>
<tr>
<td>110</td>
<td>Corporate Body</td>
<td>200</td>
<td>X</td>
<td>abncd</td>
</tr>
<tr>
<td>111</td>
<td>Conference or Meeting</td>
<td>200</td>
<td>X</td>
<td>abndce</td>
</tr>
<tr>
<td>240</td>
<td>Uniform Title</td>
<td>100</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>245</td>
<td>Title Statement</td>
<td>300</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>Edition Statement</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>260</td>
<td>Imprint</td>
<td>100</td>
<td>X</td>
<td>bac</td>
</tr>
<tr>
<td>300</td>
<td>Physical Description</td>
<td>100</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>440</td>
<td>Serial Title/Title added entry</td>
<td>100</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>490</td>
<td>Serial Title</td>
<td>100</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>Note</td>
<td>400</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>Personal Name</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>610</td>
<td>Corporate Body</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>611</td>
<td>Conference or Meeting</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>650</td>
<td>LC Subject Heading</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>651</td>
<td>Geographic Area Code</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>Personal Name</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>710</td>
<td>Corporate Body</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>711</td>
<td>Conference Name</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>850</td>
<td>Institution Holder</td>
<td>200</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: The FDT of IPB database
2. IPB database worksheets

<table>
<thead>
<tr>
<th>Control Number</th>
<th>ISBN</th>
<th>Language Code</th>
<th>UDC Number</th>
<th>Local Number/Loc</th>
<th>Author</th>
<th>Corporate Body</th>
<th>Conference</th>
<th>Uniform Title</th>
</tr>
</thead>
</table>

M - Modify  R - Right just  S - Shift  D - Delete  C - Center

<--- - Next  X - Exit

IPB / 1
3. Indexing Technique for the IPB OPAC database

<table>
<thead>
<tr>
<th>ID</th>
<th>IT</th>
<th>Data extraction format</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0</td>
<td>mhl,v100</td>
</tr>
<tr>
<td>110</td>
<td>0</td>
<td>mhl,v110</td>
</tr>
<tr>
<td>111</td>
<td>0</td>
<td>mhl,v111</td>
</tr>
<tr>
<td>240</td>
<td>0</td>
<td>mhl,v240</td>
</tr>
<tr>
<td>245</td>
<td>4</td>
<td>mhl,v245</td>
</tr>
<tr>
<td>650</td>
<td>2</td>
<td>v650</td>
</tr>
<tr>
<td>700</td>
<td>0</td>
<td>mhl,v7001</td>
</tr>
<tr>
<td>710</td>
<td>0</td>
<td>mhl,v710</td>
</tr>
<tr>
<td>711</td>
<td>0</td>
<td>mhl,v711</td>
</tr>
</tbody>
</table>

Table 2: Indexing Technique for the IPB OPAC database
4. Display and print format (default) for the IPB OPAC database
5. Source code program DBTOISIS, program converter from ascii text to ISO 2709 format

PROGRAM CONVERTER(database, INPUT, OUTPUT);
TYPE
  LNGT = STRING;
  Book = RECORD
    A : LNGT;
    B : LNGT;
    C : LNGT;
    D : LNGT;
  END;
VAR
  A : string [80];
  B : string [60];
  C : string [50];
  D : string [70];
  control : boolean;
  output, database : text;
  filedato: book; TEMP,
  Hd, HdB, EdC, EdD,
  APos, BPos, CPos, DPos, PosB, PosC, PosD,
  DBS, DBT, nameLA, nameLB, nameLC, nameLD,
  Header, direc, Head, A1, B1, C1, D1,
  Head1,Idata, data, PC, PD:string;
  Lnt, Lnt_A, Lnt_B, Lnt_C, Lnt_D, Lnt_temp, Ln,
  size, size1, size2, size3, size4,
  Ln_data, LSoPos, LInPos, LHeader,
  LDirec, Lnt_data, LReader, LPosC, LPosD : integer;
BEGIN
  WRITELN('PROGRAM DATA CONVERSION');
  WRITELN('THIS PROGRAM WILL CONVERT YOUR ASCII TEXT FILE INTO THE ISO 2709 FORMAT');
  WRITELN;
  WRITE('Write filename to be converted : ');READLN (DBS);
  WRITE('Write converted filename (ISO filename) : ');READLN (DBT);
  WRITELN;
  ASSIGN (database, DBS);
  ASSIGN(OUTPUT, DBT);
  RESET (database);REWRITE(OUTPUT);
  A := '';
  B := '';
  C := '';
  D := '';
  WHILE NOT EOF (database) DO
    BEGIN
      { }
      { Read database to be count }
      { }
      READLN(database, A);
      READLN(database, B);
      READLN(database, C);
      READLN(database, D);
    END
READLN(database, B);
READLN(database, C);
READLN(database, D);
A := A + ' #';
B := B + ' #';
C := C + ' #';
D := D + ' #';
Lnt_A := LENGTH(A);
IF Lnt_A-1 = 0 THEN A := '';
Lnt_B := LENGTH(B);
IF Lnt_B-1 = 0 THEN B := '';
Lnt_C := LENGTH(C);
Lnt_D := LENGTH(D);
STR(Lnt_A, nameLA);
STR(Lnt_B, nameLB);
STR(Lnt_C, nameLC);
STR(Lnt_D, nameLD);
 TEMP := COPY(A, 1, Lnt_A) + COPY(B, 1, Lnt_B) +
          COPY(C, 1, Lnt_C) + COPY(D, 1, Lnt_D) + ' #';
Ln := LENGTH(TEMP);
WRITE(output);
HdA := ''; APos := '00000';
IF Lnt_A < 10 THEN HdA := '000';
   IF (Lnt_A > 10) AND (Lnt_A < 100) THEN HdA := '00';
   ELSE HdA := '0';
{Tag 100}
HdB := '0';
IF Lnt_B < 10 THEN
   HdB := '000' else
   IF (Lnt_B > 10) AND (Lnt_B < 100) THEN HdB := '00';
   ELSE HdB := '0';
BPos := ' 0';
IF Lnt_A < 10 THEN BPos := '0000' else
   IF (Lnt_A > 10) AND (Lnt_A < 100) THEN BPos := '000';
   ELSE BPos := '00';
   PosB := BPos+nameLA;
{Tag250 }
HdC := '0';
IF Lnt_C < 10 THEN
   HdC := '000' else
   IF (Lnt_C > 10) AND (Lnt_C < 100) THEN HdC := '00';
   ELSE HdC := '0';
BPos := ' 0', LPosC := Lnt_A + Lnt_B; STR(LPosC, PC);
IF LPosC < 10 THEN CPos := '0000' else
   IF (LPosC > 10) AND (LPosC < 100) THEN CPos := '000';
   ELSE CPos := '00';
   PosC := CPos+PC;

HdD := '0';
IF Lnt_D < 10 THEN
HdD := '000' else
    IF (Lnt_D > 10) AND (Lnt_D < 100) THEN HdD := '00' 
    ELSE HdD := '0'; 
    DPos := ''; LPosD := LPosC + Lnt_C; STR(LPosD, PD); 
    IF LPosD < 10 THEN DPos := '0000' else 
    IF (LPosD > 10) AND (LPosD < 100) THEN DPos := '000' 
    ELSE DPos := '00'; 
    PosD := DPos + PD;

A1 := '245' + HdA + nameLA + APos; 
B1 := '100' + HdB + nameLB + PosB; 
C1 := '260' + HdC + nameLC + PosC; 
D1 := '560' + HdD + nameLD + PosD;

IF Lnt_A < 2 THEN Direc := B1 + C1 + D1 + '#' else 
IF Lnt_B < 2 THEN Direc := A1 + C1 + D1 + '#' else 
Direc := A1 + B1 + C1 + D1 + '#'; 
LDirec := LENGTH(Direc); 
LHeader := 24 + LDirec; STR(LHeader, Head1); 
Head := ''; 
IF LHeader < 10 THEN Head := '0000' else 
    IF (LHeader > 10) AND (LHeader < 100) THEN Head := '000' 
    ELSE Head := '00'; 

Lnt := Ln + LHeader; STR(Lnt, Ldata); 
Hd := ''; 
IF Lnt < 100 THEN Hd := '000' ELSE Hd := '00'; 
Ldata := Hd + Ldata; 
Head := Head + Hd; 
Header := Ldata + '0000000' + Head + '0001500' + Direc;

Data := Header + Temp; 
{
  DATA CONVERSION PART
}
{
  rewrite line 1
}

IF LHeader < 80 THEN LHdr := LHeader ELSE LHdr := 80 - LHeader;
BEGIN 
IF LHeader < 80 THEN 
  WRITE(output, COPY(Header, 1, LHdr));
END; FLUSH(output);

BEGIN 
Lnt_Temp := LENGTH(Temp); control := TRUE; 
IF Lnt_Temp = 0 THEN control := FALSE; 
IF control THEN 
BEGIN 
    IF LHeader < 80 THEN size := 80 - LHeader 
    ELSE size := 160 - LHeader; 
    IF Lnt_Temp <= size THEN size1 := Lnt_Temp

102
ELSE size1 := size;
WRITELN(output,COPY(Temp,i,size1));
END;FLUSH(output);
END;
{rewrite line2}
BEGIN
Lnt_Temp := LENGTH(Temp);
Lnt_data := LENGTH(Data); control := TRUE;
IF Lnt_Data <= 80 THEN control := FALSE;
IF control THEN
BEGIN
IF Lnt_data <= 160 THEN size2 := Lnt_Temp
ELSE size2 := 80;
WRITELN(output,COPY(Temp,size1+1,size2));
END;
END;FLUSH(output);
{rewrite line 3}
BEGIN
Lnt_Temp := LENGTH(Temp);
Lnt_data := LENGTH(Data);
IF Lnt_Data < 160 THEN control := FALSE;
IF control THEN
BEGIN
IF Lnt_data <= 240 THEN size3 := Lnt_Temp-(size1+size2)
ELSE size3 := 80;
WRITELN(output,COPY(Temp,size1+size2+1,size3));
END;
END; FLUSH(output);
{rewrite line 4}
BEGIN
Lnt_Temp := LENGTH(Temp);
Lnt_Data := LENGTH(Data);
IF Lnt_Data < 240 THEN control := FALSE;
IF control THEN
BEGIN
size4 := Lnt_Temp - (size1+size2+size3);
WRITELN(output,COPY(Temp,size1+size2+size3+1,size4));
END;
END;FLUSH(output);
END;
WRITELN;
END.

103
Appendix 5. User guide to IPB database

1 Introduction

IPB is a sample computerized information system. This database is placed in the server of Department of Information Studies. It is planned to be used at The Bogor Agricultural University Library, for all bibliographies and literature files and intended to replace the old card catalogue. The database will be a single file database aimed to cover all books, monograph, report and reference collection of Bogor Agricultural University Library.

This database contain fields according to INDOMARC format. Appendix 1 is intended to figures those fields and the field tags. All fields are searchable using free text retrieval facility. Fast retrieval facility is provided using keyword (inverted file) for field such as AUTHOR(S) (TAG 100 and 700), any word from TITLE (TAG 245), and KEYWORD(S) (TAG 650).

2 How to Open the File

Main menu always standby on screen. When main menu is not on screen, type GUESTLOG to call the main menu. From the main menu select the following options,

CDS ISIS (ver 2.32)

No need to press RETURN key after the selection. The CDS ISIS main menu will be displayed. If the IPB database is not in use press C from main menu and type IPB when the the system ask you to type the database name.

3 How to Search the records

1. Using ISISPAS

First, you select A (ISISPAS) from main menu. Three option will be displayed on the bottom of the screen. C for compile R for Run and Q for Quit. Select R for run the text retrieval facility, and type TEXT. Input the field tag number (field name) followed by enter, then type the word or phrase (string) to be retrieved (maximum 30 character). For example, 245 (for tag number of title) and ONLINE for the string to be retrieved. The first record retrieved will be displayed (if there is relevant document). Press enter to see the next record or X to terminate displaying the record.

2. Using ISISRET

• type S to search information retrieval services

Information retrieval services will be displayed. From this menu you can browse master file by pressing B. You can also search a particular topic by pressing S. type word(s) or phrase(s) to be searched when the CDS/ISIS
ask you to do so. The word(s) can be truncated using dollar sign ($) For example:

- Online
- Online catalog$
- etc.

You can also use boolean expression in your searching to widening or narrowing your search. The boolean used by the CDS/ISIS is + for OR, * for AND, and " for NOT. For example :

- Online * Hancock-Beaulieu
- Online catalogues + OPAC + Computerised cataloguing
- etc.

Only indexed terms can be retrieved using this facility.

3. Using Dictionary List

Press T from information retrieval menu. You will be asked the beginning of the term to be displayed. Type term as you wish such as ONLINE for example. The list of the term starting from ONLINE will be displayed on the screen. Chose the term to be searched by highlighting the term and press S for select sequently. Combine the word or phrase if you wish by using boolean operator + for OR, * for AND, and " for NOT. Again, only indexed terms can be retrieved using this facility.

4. Using Free Text Retrieval Facility

Press S from information retrieval menu. You will be asked the search expression. Type the word and/or phrase precede by question sign (?) to indicate the free text retrieval. You can limit your search by indicating the field to be searched. For example :

- ? v245 : 'online'
- ? v245 : 'online' and v100 : 'Hancock-Beaulieu'
- etc.

You can also use this facility to narrowing down your previous search when your search result is too big. For example:

- ? #3(v245:'online') and v100:'Hancock-Beaulieu'

(Note: #3 is your previous search result)
You can use this facility for both indexed and non indexed terms.
Tag and Field Name of IPB Database

<table>
<thead>
<tr>
<th>Tag</th>
<th>Field Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Control Number</td>
</tr>
<tr>
<td>20</td>
<td>ISBN</td>
</tr>
<tr>
<td>41</td>
<td>Language Code</td>
</tr>
<tr>
<td>80</td>
<td>UDC Number</td>
</tr>
<tr>
<td>99</td>
<td>Local Number</td>
</tr>
<tr>
<td>100</td>
<td>Personal Name (Author)</td>
</tr>
<tr>
<td>110</td>
<td>Corporate Body (Author)</td>
</tr>
<tr>
<td>111</td>
<td>Conference or Meeting (Author)</td>
</tr>
<tr>
<td>240</td>
<td>Uniform Title</td>
</tr>
<tr>
<td>245</td>
<td>Title Statement</td>
</tr>
<tr>
<td>250</td>
<td>Edition Statement</td>
</tr>
<tr>
<td>260</td>
<td>Imprint</td>
</tr>
<tr>
<td>300</td>
<td>Physical Description</td>
</tr>
<tr>
<td>440</td>
<td>Serial Title/Title added entry</td>
</tr>
<tr>
<td>490</td>
<td>Serial Title</td>
</tr>
<tr>
<td>500</td>
<td>Note</td>
</tr>
<tr>
<td>600</td>
<td>Personal Name (Subject)</td>
</tr>
<tr>
<td>610</td>
<td>Corporate Body (Subject)</td>
</tr>
<tr>
<td>611</td>
<td>Conference or Meeting (Subject)</td>
</tr>
<tr>
<td>650</td>
<td>LC Subject Heading</td>
</tr>
<tr>
<td>651</td>
<td>Geographic Area Code</td>
</tr>
<tr>
<td>700</td>
<td>Personal Name (Co-Author)</td>
</tr>
<tr>
<td>710</td>
<td>Corporate Body (Added Entry)</td>
</tr>
<tr>
<td>711</td>
<td>Conference Name (Added Entry)</td>
</tr>
<tr>
<td>850</td>
<td>Institution Holder</td>
</tr>
</tbody>
</table>