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CARSTIN Training Workshop/Seminar on  
Network Development in the Caribbean  
Port-of-Spain, Trinidad  
3-14 December 1984



CDS/ISIS

Presented by  
Clifford G. Willabus



**UNITED NATIONS**

ECONOMIC COMMISSION FOR LATIN AMERICA Office for the Caribbean

LC/CNR/L.134(SEM  
1/7)  
GDCC/CARSTIN/84/7

Caribbean Science & Technology Information Network  
(CARSTIN)

Training Workshop/Seminar  
on  
Network Development in the Caribbean  
Port-of-Spain, Trinidad & Tobago  
December 3-11, 1984

CIS/ISIS

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Clifford G. Willabus

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WHAT IS CDS/ISIS

- o Computerised Documentation Service/Integrated Set of Information System.
- o A table driven, generalised database management system designed specifically to handle non-numerical databases.
- o Consists of three (3) major functional components:
  - ° File maintenance
    - ° Retrieval
    - ° Sorting and printing facilities
  - ° File maintenance facilitates
    - . entry of data
    - . . modification of data entered
    - . update of Master and Inverted file
  - ° Retrieval
    - . on-line
    - . batch

3.

° **Sorting and printing facilities**

. used for production of catalogues, indexes and other specialised type of output; also

. includes a photocomposition interface for the production of high typographical quality publications.

HISTORY

- o UNESCO began developing software for information processing since 1971.
- o At the time the organisation had an ICL 1900 series mainframe.
- o In 1975 the ICL computer was replaced by an IBM and hence they were faced with a problem of conversion.
- o Rather than rewrite existing programs they decided to adapt an early version of ISIS package developed by the ILO in the late sixties. This was because a lot of institutions in developing countries were already using this system.
- o A major redesign was done by UNESCO since the ILO version lacked many of the features that were present in the original UNESCO ICL Version; also the ILO version was designed to run on small IBM mainframes, whereas UNESCO had acquired a large mainframe.
- o Since then the system has been enhanced and updated and by the end of 1983 UNESCO had announced Release 4.4. of their version of CDS/ISIS. This latest release has the following features:
  - o utilises an advanced file structure and access method (VSAM).
  - o full screen editor for data entry and update.
  - o on-line thesaurus creations and maintenance.
  - o thesaurus aided indexing and retrieval.
  - o extended search language.
  - o specialised library applications such as acquisitions and periodical circulations.

MAJOR ISIS FEATURES

- o User-controlled composition of each Master file:
  - ° fields which make up a record are specified by means of a Field Definition Table (FDT).
  - ° one entry exist in the FDT for each field.
  - ° one FDT exists for each logical database.
  
- o Generalised logical record structure for master records:
  - ° one record format is used for all internal data manipulations.
  - ° all databases use this same structure although their content may be different.
  - ° user references to data elements are by field tag.
  
- o Online or batch data entry:
  - ° new records can be added to a database using online terminals; these additions are to a transaction file.
  - ° or by using a batch program.

o Online or batch corrections and editing facilities:

- o after records are entered into the database they can be modified.
- o modifications include addition or deletion of fields, modification of data within fields.
- o records can be copied or deleted within a database as well as copied or moved between databases.
- o global change function allows one or more changes to be applied to the whole or selected portions of the master file.

o Access to Master records via the Inverted file:

- o each ISIS database is composed of master and inverted file records.
- o the inverted file is an index to the master file. It contains all the access points or terms used in retrieval.
- o it is possible to invert the master file on every field in the record.



o Inverted file - initiated changes to the Master file:

- o records on the inverted file are created from the fields in the master file records.
- o if a term on the inverted file is incorrect then correcting this, results in changes being generated for the master file records.

o Controlled or uncontrolled indexing vocabulary:

o controlled

index terms are selected from a controlled list or thesaurus.

o uncontrolled

all words in a file except those defined in a stop-word list, can be used as an index term.

o Online or batch retrieval:

- o can search the database interactively; or
- o use a batch job for routine printing jobs
- o capability for root and proximity searching, at the group or field level;
- o search language is based on boolean logic.

8.

o Multiple file search:

- ° retrieval can be done against a number of databases.
- ° each query is presented to only one database at a time but is not lost while switching from one database to the other.

o Multiple file indexing:

- ° access terms to a record in one database could have been derived from another database.

o Print Formatting language:

- ° a generalised extraction and printing program provides for a complete range of printed output;
- ° includes a simple arithmetic processor.

o Photocomposition program:

- ° produces photocomposed output which can directly drive a DIGISET 40T2 photo-composer.

- o Multiple file printing:

- o a feature of the print formatting language which enables records to be extracted from different databases or from within the same database.
- o these records must have been linked together when the database was created.

- o Code lookup:

- o data can be entered in coded form and the codes translated when the element printed.

- o Standardised communication format interface:

- o programs exist which can convert ISIS database to ISO-2709 format and vice versa.
- o ISO-2709 is the international standard format for the interchange of bibliographic information on magnetic tape.

HOW DOES CDS/ISIS WORK

In attempting to explain how ISIS works the operations in a typical library will be considered.

Assume that the system is used to automate the following functions:

- . ordering
- . cataloguing
- . retrieval
- . circulation

1. Field Definition

The first step in computerising the operation is to decide what information you would like to record. Let's assume that for each document the following will be recorded:

Author  
 Title  
 Publisher/City  
 Order/receipt/process date  
 Descriptor  
 Status  
 Borrower's name, date  
 Price

One defines this to the system by means of the Field Definition Table (FDT). In the FDT we specify some of the following characteristics for each field:

- field tag
- access/lookup file verification
- field length

11.

- fixed/variable
- subfields
- No. of repetitions

Exhibit 1. is the FDT for our sample application.

**Field Tag:**

A two digit number used to represent each field in the database. In our example - 01 is the tag for the author field.

**Field Length; fixed/variable:**

Fields can be of fixed length or they can be of variable length. For a variable length field we specify the maximum length of the field. All fixed fields carry a tag of 00.

Note: When we enter information for a variable field, the length that is stored is exactly that which is entered.

**Access/lookup file verification:**

For fields that are coded, we can store all the codes on the inverted file or on what is called a 'lookup file'. The system can verify that a code is correct by checking to see if it exists on one of these files.

**Subfields:**

A field can contain subfields each identified by a delimiter. Field '03' contains the subfield 'Publisher' and 'City'.

## 2. Data Entry

In the Field Definition Table we also specify the layout for the data entry screens. When the data entry operator is signed on to the database and requests to create a new record, the data entry screen will appear as in Exhibit 2.

The operator simply fills in the blanks with the relevant information for a record. When all of the information has been entered the system will redisplay the newly created record. The operator can then invoke the full screen editor to make any corrections to the record. Using the full screen editor the record is displayed as in Exhibit III.

The last entry in the Field Definition Table is the layout for the display screen during retrieval. Commands of the print format language are used to specify the fields as we would like them displayed on the screen.

So far, we have defined the structure of the records of our new master file. We have also format our data entry screen and we have seen how the data entry is accomplished. The next thing we have to do is to indicate to the system what fields we would like to use for retrieval.

## 3. Inverted file generation

In CDS/ISIS there are several indexing techniques available:-

Full field:

- the entire contents of the field up to a length of 50 characters is used as a term.

#### Words in the field:

- here all the words in the field are used as an index to the record. Normally, we will make a list of all words like "a", "an", "the", "of", "is", "it", which we do not want to be used as an index term. Such a list is called a "stop word list". The system will not use a word as an index term if it appears in this list.

#### Words enclosed in < > or / /:

- we can use this technique to identify keywords in the abstract field.

#### Use of a prefix with each index term:

In order to facilitate retrieval we can also associate a prefix with each search term. All the terms from a given field and for a particular indexing technique will have the same prefix. For example - the inverted file criteria will be specified as follows:-

01/00	A;
03/00	T;
03/A3	TT;
05/ *	P;
05/ C	C;
07/A6	
09/00	ST;
11/ *	B;
11/ D	D;

Notice that we have used a prefix with each term to be created. Also, we are inverting our master file on every field. Hence, every field in the record can be used as an access point. The use of a prefix allows us relate a term to the field from which it was extracted.

E.g. To retrieve documents by Author Jones,  
the search term will be A;JONES.

#### 4. Update process

- . Master file is not updated online.
- . Since all retrieval is done against the master file, then, if a change is done to a master file record and a search subsequently done, the change will not be seen in the record retrieved.
- . All new or modified records are stored in the transaction file.
- . Update process is started at the end of each online session. It is done by a batch program, during which records are transferred from the transaction file to the master file.
- . During update of the master file, changes to the inverted file are generated and these are stored on the LINK file.
- . The LINK file is then used to update the master file.



- . Log of changes to both the master file and the inverted file are stored on a log file.
- . This log is use to update a previous backup copy of a database when it is restored.

#### 4. Generating Output

When we order material, we create a record with the following:-

Author, Title, Publisher, Order date, Status = 0.

All the books on order will have status 0. Hence, to produce the orders list retrieve all records with an '0' in the status field. Our printout will look like Exhibit IV.

When the books are received we change the status to 'R' and also the date in field 07. This date will again be changed when the book is catalogued and also the status is changed to 'C'. At the end of the month, we can produce our current awareness bulletin showing all the books that were catalogued, by selecting all the records with a 'C' in the status field. When this listing has been produced, we can change the status to 'P' to indicate that the book has been processed. If the book is loaned out during the last stages of processing, we use an additional code CL or PL to indicate that the book is on loan.

When the book is loaned out, the loan information is placed in field 10. To produce a listing of books on loan, we will select all records with an 'L' in the status field.

RETRIEVAL1. General

- ° allows a user to submit a query to a database and to extract records based on the query.
- ° retrieval can be on-line or in batch.
- ° both methods utilise the same query language.

2. Query language

- ° based on boolean algebra.
- ° search formulations are constructed using the boolean operators "and", "or" and "not" to connect query terms;
- ° a query term is an access point which represents the class of records associated with that access point. E.g. refer to Exhibit V.
- ° the operands of a search formulation can be a search term, a right truncated search term or an any term.

**Right truncated search term:**

- ° instead of specifying a precise term, we give only the root or leading sequences of characters followed by a "\$".  
See Exhibit VI.

the system automatically performs a logical OR operation between all search terms having the specified root.

**Any term:**

a generic term representing a predefined set of search terms.

E.g. ANY CARIBBEAN here we define the term CARIBBEAN to be any of the terms.

BARBADOS, BELIZE, ANTIGUA, JAMAICA, etc.

Other features of the language include:-

**Dot feature:**

This allows us to group index terms into primary and secondary terms. The primary terms being the most important.

Primary terms are specified by preceding the term with a period or dot.

E.g. .SOLAR ENERGY + ANY CARIBBEAN

**Proximity Operator:**

allows us to specify a formulation where terms A and B are not more than a specified number of words apart in a field.

E.g. A.B adjacent

A..B at most one word between A and B

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. where terms A and B are exactly 'n' words apart

E.g. A\$B adjacent

A\$\$B exactly one word between A and B.

Text Facility:

This is a text matching feature which assists the user in refining search requests. Three options are available:-

(a) String Search:

. allows us to select records which contain a specified string of characters in a field.

E.g. TEXT 02 'INFORMATION'

will select records where the word 'information' occur in field 02.

(b) Relational Conditions:

. allows us to select only those records for which certain conditions on the contents of the field are verified.

E.g. TEXT 06 > '100'

will select records where value of field 06 is greater than 100.

## (c) Field presence or absence:

- allows us to test for the presence or absence of a field.

E.g. TEXT 01A

will select the record if field 01 is absent.

TEXT 01P

will select the record if field 01 is present.

3. Online retrieval

- During on-line retrieval the user enters a query element.
- in response the system displays the number of master records matching each term as well as the total number of records satisfying the query element.
- these counts give the retriever a quantitative assessment of the search formulation.
- the user may broaden or narrow the scope of the search; or
- he may invoke the display function to view the records;
- after viewing the records the SAVE function is used to request a hardcopy printout. This printout will not be done immediately as it is requested but later when the files are placed offline and the batch updates are done.

- ° the CHANGE function can be used to switch to another database. Only one database can be searched at any time.
- ° the RECALL function allows you to view all the queries that were entered during the search sessions. A previous query can be re-executed. The FLUSH command will delete all queries submitted so far.
- ° A sample search session is shown in Exhibit VII.

#### 4. Batch retrieval

- ° This provides for the processing of a batch of one or more queries.
- ° a batch may be prepared directly by the user or it may be as a result of one or more SAVE commands issued by the terminal operator.
- ° Batch retrieval will be used to produce our customised reports such as:-

Bibliographies

Catalogue cards

Order lists

Overdue listing

Current awareness lists

- ° For each query in the batch we may specify different sorting and printing parameters.

o Sorting the output of a query:

- . output can be sorted by any desirable combination of fields and subfields.
- . fields by which records are sorted may be used as a heading.
- . can also have second level headings.
- . the system allows an unlimited number of sort keys but up to four levels of headings.
- . this facility allows for the production of indexes, i.e. listings in which a given record may appear under more than one heading.

o Printing the output of a query:

. Cross references

can insert cross references in printed output i.e. in producing bulky indexes, one can print the full record under the main entry and a short reference under secondary entries.

. table lookup facility

coded data can be replaced by its full text equivalent.

22.

o simple numeric processor

. facilitate the following calculations:

totals

averages

minimum

maximum

all these are computed on change of a heading.



HARDWARE AND SOFTWARE REQUIREMENTS

- o Requires IBM 370, 303x, 43xx or compatible computers using OS/VS1 or MVS operating system.
- o For data storage any of the following can be used IBM 2314, 3330, 3340, 3350 disk drives.
- o Release 4.4. expected in January 1985 will utilise only VSAM files.
- o Also expected in March 1985 is a DOS/VSE version which will be compatible with the OS/VS1 version.
- o Requires the use of the CICS teleprocessing monitor. Overheads will depend on number of terminals and databases in use.
- o Region required by batch programs is minimum of 512K. This is not really significant on a large mainframe.
- o Most significant resource will be disk storage required for the databases. Mainly the master and the inverted files.
- o CPU is heavily used during batch update of databases.
- o Requires PL/1 compiler.
- o 3270 or compatible terminals.

ISIS AT CDB

- o a database of more than 13000 records.
- o all CDB documents are completely indexed
- o includes all documents currently being acquired by the library
- o Monthly Acquisitions list
- o Current awareness bulletin
- o Orders listing.

## GLOSSARY

The following definitions are used for the purpose of this presentation:-

- Field : A unit of information of the entity we are describing.
- Record : A collection of fields.
- File : A collection of records.
- Database : A collection of files related to each other.
- Tag : A two digit number which represents a field.
- Master File : file on which all the main information for a database is stored.
- Inverted File : file in which all terms by which the database can be accessed are stored.
- Transactions File : contains copies of records that are being modified or added to the Master file.
- Batch : where access to files on the computer is through a computer program. The user submits a program which processes information on the file and prints the results.
- (N.B. One can still have on-line terminals and be operating in a batch mode).
- On-line : where you use a computer terminal to interact with files on the computer in a conversational mode.

DATA BASE: SAMPLE

FIELD DEFINITION TABLE

PAGE

SAMPLE  
 USR SAMPLE TEST SC

FIELD DEFINITIONS  
 -----

TAG	FIELD NAME	LEN	POS	IND	T	AF	S	DELIMITERS
01	AUTHOR	0030		9	1			
**								
03	TITLE	0200		1	1		*	
**								
05	PUBLISHER	0250		1	1		F-C	
**								
07	DESCRIPTOR	0200		1	1			
**								
09	STATUS	0001		1	1	C		
**								
10	ORDER/RECEIPT/LOAN DATE	0006		1	1	N		
**								
12	BURROWER & DATE	0050		1	1		F-L	
13	PRICE	0008		1	1			
01000	DFA	0001						
	AUTOMATIC DISPLAY ENABLED							
	AUTOMATIC RECORD NUMBERING ENABLED							
	LOWER CASE DATA ENTRY							
	HISTORY PROCESSING DISABLED							
	NO ASSOCIATED THESAURUS							

PRJCF COPY PRINT FORMAT

##JCL,/,T01,X5,T03,X5,T05,X5,T07,X5,T09,/,T10,X5,T12,X5,T13

\*\*\*\*\*

WORKSHEET DESCRIPTION SAMPL01

WS=SAMPL01 01(40,\*3),03(04),05(40),07(200),09(02),10(06),12(50),13(08)

\*\*\*\*\*

DISPLAY FORMAT REGIS1

0 000 020

##VCE"",C30,V04"",C55,V03"",C65,V05"",/,V01"",C15,V10(14,14)""

\*\*\*\*\*

PFREG1

DISPLAY FORMAT 999999

0 000 020

\*\*\*\*\*

PF9999

\*\*\* CDPVSP38 - END OF RUN - RETURN CODE: 0

DATA ENTRY SCREEN

EXHIBIT 2.

AUTHOR:	
TITLE:	
PUBLISHER:	
DESCRIPTION:	
ISSUE:	ORDER/RECEIPT/LOAN DATE
ISSUE NUMBER & DATE:	
PRICE:	
STATUS:	

BEFORE THE FIELDS ARE FILLED IN

AUTHOR:	Williamus, D.G.
TITLE:	CDS/ISIS Seminar Presentation
PUBLISHER:	EDB/Wiley
DESCRIPTION:	LIBRICATION RETRIEVAL <LIBRARY AUTOMATION>
ISSUE:	C ORDER/RECEIPT/LOAN DATE:
ISSUE NUMBER & DATE:	
PRICE:	
STATUS:	

DATA BASE: SAMPLE      RECORD: 000001

END

==>      MSG: ENTER MODIFICATIONS

01/001	AUTHOR	Willabus, C.G.	<
03/...	TITLE	CDS/ISIS Seminar Presentation	
05/...	PUBLISHER	CDB7cWildey	
07/...	DESCRIPTOR	<INFORMATION RETRIEVAL><LIBRARY AUTOMATION>	
09/...	STATUS	C	

## PERIODICALS DATABASE

01/05/84

BCA Publications Ltd.

US

(000214) 332.8(05)  
The bank credit analyst - interest rate forecast  
PUBLISHED BY: BCA Publications Ltd.  
SUBSCRIPTION: Jul 1980 - Dec 1984 US 375.00  
NO. OF COPIES: 1 FREQUENCY: monthly  
ROUTING LIST: Finance Department.

TOTAL: 375.00

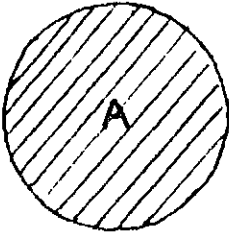
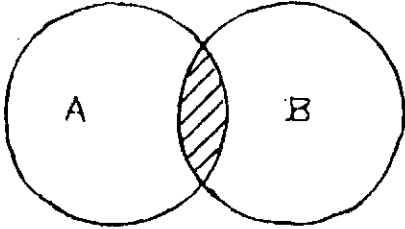
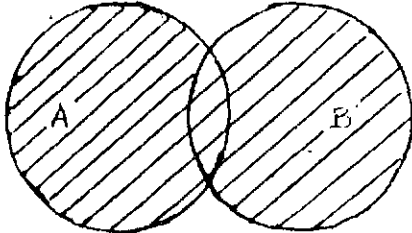
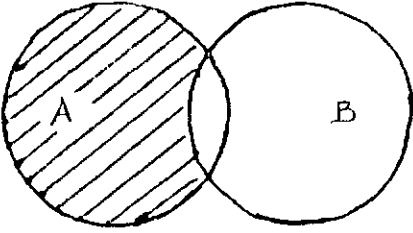
Blackwell's Periodicals

St.

(000201) 02(05)  
Journal of librarianship  
SUBSCRIPTION: Apr 1980 - Dec 1984 St. 26.40  
NO. OF COPIES: 1 FREQUENCY: quarterly

(000202) 02(048)  
Library and information science abstracts  
SUBSCRIPTION: Jan 1980 - Dec 1984 St. 132.00  
NO. OF COPIES: 1 FREQUENCY: monthly  
ROUTING LIST: Ms. Marshall.

TOTAL: 158.40

QUERY FORMULATION	RETRIEVAL DOCUMENT SET
TERM A	
TERM A <u>AND</u> B	
TERM A <u>OR</u> B	
TERM A <u>NOT</u> B	



-- PAGE 001 --

QUERY ELEMENT #002

- F=000053 INFORMATION
- F=000002 INFORMATION ANALYSIS
- F=000021 INFORMATION DISSEMINATION
- F=000012 INFORMATION EXCHANGE
- F=000003 INFORMATION NEEDS
- F=000003 INFORMATION NETWORK
- F=000002 INFORMATION POLICY
- F=000018 INFORMATION PROCESSING
- F=000001 INFORMATION RECORDING
- F=000005 INFORMATION RETRIEVAL
- F=000006 INFORMATION SCIENCES
- F=000030 INFORMATION SERVICES
- F=000012 INFORMATION SOURCES
- F=000059 INFORMATION SYSTEMS
- F=000018 INFORMATION TECHNOLOGY
- F=000005 INFORMATION USERS

T=000157 - #018: INFO#

T=000157 - #002: #018

-- END --

RXX01 - SELECT THE DESIRED FUNCTION

=computers\*

-- PAGE 001 --

QUERY ELEMENT #001

F=000184 COMPUTERS

T=000184 - #002: COMPUTERS\*

T=000184 - #001: #002

-- END --

-- PAGE 001 --

(013519) 69(42)

GB.

Financial Times (London, GB).

UI building industr.

Financial Times

31 Mar 1984.

6P.

General.

(UNITED KINGDOM), (CONSTRUCTION INDUSTRY), (HOUSING), (MARKETING), (COMPUTERS),  
(CONSTRUCTION MATERIALS), (INVESTMENTS), (REFURBISHMENT), (MANAGEMENT DEVELOPMENT)

CDB

-- MORE --

-- PAGE 002 --

(013323) 620.92:531.62:681.14

XZ.

US, Department of Energy (Washington, D.C., US).

-- PAGE 001 --

NO.	DBN	HITS	TERM
001	LIBRARY	000184	=COMPUTERS4
002	LIBRARY	000322	=MANAGEMENT
003	LIBRARY	000041	=#1 + #2
004	LIBRARY	000058	=MANAGEMENT INFO4
005	LIBRARY	000041	=#1 + #2

-- END --

-- PAGE 001 --

QUERY ELEMENT #007

F=000053 SECURITY

T=000053 #007 SECURITY

-- END --

-- PAGE 001 --

NO.	DBN	HITS	TERM
001	LIBRARY	000184	=COMPUTERS4
002	LIBRARY	000322	=MANAGEMENT
003	LIBRARY	000041	=#1 + #2
004	LIBRARY	000058	=MANAGEMENT INFO4
005	LIBRARY	000041	=#1 + #2
006	LIBRARY	000184	=COMPUTERS4
007	LIBRARY	000053	=SECURITY

-- END --

ISPO5 - ENTER NEXT COMMAND

QUERY ELEMENT #009

1=000041 = #005

1=000057 = #007

1=000065 = #010 #005 + #007

1=000091 = #009 #010

-- END --

-- PAGE 001 --

NO.	DIR	RTS	TERM
001	LIBRARY	000184	=COMPUTERS4
002	LIBRARY	000322	=MANAGEMENT
003	LIBRARY	000041	=#1 + #2
004	LIBRARY	000058	=MANAGEMENT INFO4
005	LIBRARY	000041	=#1 + #2
006	LIBRARY	000184	=COMPUTERS4
007	LIBRARY	000053	=SECURITY
008	LIBRARY	000000	= -- PAGE 001 --
009	LIBRARY	000005	=#5 + #7

END

-- PAGE 001 --

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

018

END

-- PAGE 001 --

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

000000 000000 011.50 X2.

(011585) 681.14(063)

XZ.

Fak, V.

Security, IFIP/Sec'83. Proceedings ...

Price, W. L.

Key management for data encipherment.

CONFERENCE IFIP Security Conference, 1.

SPONSOR Swedish Society for Information Processing (Stockholm, SE).

International Federation for Information Processing (Stockholm, SE).

Stockholm, SE.

1983.

205-215p.

General.

(COMPUTERS), (SECURITY), (MANAGEMENT), (PRIVACY PROTECTION), (DATA PROTECTION)

-- MORE --

-- PAGE 004 --

(011580) 681.14(063)

XZ.

Fak, V.

Security, IFIP/Sec'83. Proceedings ...

Boymed, L.

A method for testing vulnerability.

CONFERENCE IFIP Security Conference, 1.

SPONSOR Swedish Society for Information Processing (Stockholm, SE).

International Federation for Information Processing (Stockholm, SE).

Stockholm, SE.

1983.

161-168p.

General.

(COMPUTERS), (DATA PROCESSING), (SECURITY), (RISK ANALYSIS), (MANAGEMENT)

-- END --

1983. 288p. General.

1983.

288p.

General.

<MANAGEMENT>, <SECURITY>, <SECURITY MEASURES>, <INDUSTRY>, <COMPUTERS>, <ENTERPRISES>

-- MORE --

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