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LAKEHEAD UNIVERSITY

**Introduction To The
COMPUTER CENTRE**

P R E F A C E

This manual is intended to provide a brief introduction to the Lakehead University Computer Centre. Included is a history of the Computer Centre, the functions of the Computer Centre, the computer configuration, the personnel list of the Computer Centre, and a short resume of some of the Academic and Administrative Systems which are in use.

Further information on the use of the Computer facilities is available in the Computer Centre Users Manual. In addition, the Computer Centre publishes a newsletter called LUCIFER in order to keep the users informed on new policies, procedures, and computer systems.

W. Bilyk
Assistant Director
Computer Centre

May 29th, 1970

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HISTORY OF THE COMPUTER CENTRE

The Lakehead University Computer Centre came into existence during the early months of 1967 with the appointment of a Director and the placing of an order for a medium-size computer, an IBM Series 360 Model 40 H. This was made possible as the result of the awarding of an Ontario Provincial Government Capital Grant to the University to provide computer facilities for undergraduate teaching, academic research and administrative data processing.

By January, 1968, the computer had been delivered and installed. Throughout 1968 and 1969 there was a continuing growth in the number of personnel in the Computer Centre. A restructuring of the Computer Centre was performed to separate the main areas of responsibility and service into four sections: Academic Services, Administrative Data Processing, Operations, and Systems Software, with a manager responsible for each section. The increased and varied use of the Computer facilities resulted also in the acquisition of additional computer equipment; mainly typewriter and cathode ray tube terminals and a 2314 auxiliary disk storage unit.

During the late months of 1969, the work load on the Model 40 Computer was rapidly nearing full capacity and all projections on future usage indicated a definite requirement for a larger computer. An order for an IBM Series 360 Model 50 H was placed, and the machine was installed in April, 1970. Plans were also formalized to add a further one million positions of large capacity storage in September 1970. This would enable the use of on-line terminals by students, faculty, and administration personnel.

Operations

The Operations group is separated into three sub-groups as follows:

- (1) Data Preparation. This group provides keypunch and verifying services for Faculty, Administration, and Computer Centre Personnel, in addition to the bursting, decollating, and binding of computer output.
- (2) Data Control. The functions of this group include the following:
 - (a) maintenance of production systems' documentation,
 - (b) maintenance of a magnetic tape library,
 - (c) obtain and maintain statistics of jobs processed.
- (3) Computer Operations. This group is responsible for the actual operation of the Computer equipment, maintaining a liason with the computer users, recording statistics on equipment usage, and the scheduling of all computer jobs.

Systems Software Services

The Systems Software group is responsible for the development and maintenance of the Operating System and other system programs. This includes the modifications and additions to IBM supplied programs as well as the design of system programs for the special requirements of the University. They also carry out performance evaluations on the computer systems and the computer hardware.

- 1 IBM 082 card sorter
- 1 IBM 557 card interpreter

Director	W. J. Wilson	10
Secretary	John W. Anderson	10
	John W. Anderson	10

Academic Services

Department Head	Dr. J. H. Smith	10
Faculty Services	Dr. J. H. Smith	10
	Dr. J. H. Smith	10

Administrative Data Processing

Department Head	Dr. J. H. Smith	10
Senior Programmer	Dr. J. H. Smith	10
System Manager	Dr. J. H. Smith	10
Programmer	Dr. J. H. Smith	10
	Dr. J. H. Smith	10
	Dr. J. H. Smith	10

Operations

Department Head	Dr. J. H. Smith	10
Data Preparation	Dr. J. H. Smith	10
Input Control	Dr. J. H. Smith	10
Keyboard Operator	Dr. J. H. Smith	10
	Dr. J. H. Smith	10
	Dr. J. H. Smith	10
	Dr. J. H. Smith	10
	Dr. J. H. Smith	10
	Dr. J. H. Smith	10

COMPUTER CENTRE PERSONNEL

		<u>Extension</u>
Director	Mr. A.T. McEwan	354
Secretaries	Miss M. Sliskovich	354
	Miss H. Sadowski	354
<u>Academic Services</u>		
Systems Support Department Head	Mr. W. Bilyk	407
Faculty Advisors	Mr. D. Watson	383
	Mr. G. Davis	525
<u>Administrative Data Processing</u>		
Department Head	Mr. G. Candido	316
Senior Programmer	Mr. P. Kempe	532
System Analyst	Mr. J. Edwards	436
Programmers	Mrs. L. Raty	435
	Mr. J. Hansen	435
	Mr C. Morrison	436
<u>Operations</u>		
Department Head	Mr. D. Domansky	408
Data Preparation:		
Supervisor	Mrs. M. Wilkins	405
Keypunch Operators	Miss M. Horbow	405
	Mrs. F. Green	405
	Mrs. C. Shivcharan	405
	Mrs. M. Lai	405
	Mrs. J. Jewett	405

SUMMARY OF THE ACADEMIC SYSTEMS

Resume of Some Academic Systems

A major part of the computer time and the Computer Centre services is dedicated to the processing and support of systems for the Academic community of the University. The interests and the needs of this community vary and they require a wide range of computer applications and support from the Computer Centre.

There are two main areas of use for the Academic systems: teaching and research.

Teaching: There are several programming and Computer Science courses available at the University for undergraduate students. The computer languages covered in these courses include PL/1, COBOL, FORTRAN, HYPO, and APL. In addition, the Computer Centre is preparing a number of service courses utilizing television video tapes and typewriter terminals in a conversational mode. In this way, individual classes may obtain short introductory courses into various computer systems.

Research: Faculty members and graduate students who are involved with research work require a large variety of systems including: FORMAC (a language for the algebraic manipulation of systems) and CSMP (Continuous System Modelling Program) used in research on lunar theory computations aimed at predicting the position of the moon; SYMAP, a computer mapping system used by the Geography Department in producing contour, conformal, and proximal maps on the line printer; BMD (Biomedical Statistical programs) used by many departments for statistical analysis of data; SSP (Scientific Subroutine Package) which contains a large variety of scientific subroutines.

Resume of Some Academic Systems

Continuous System Modelling Program(CSMP)

This system allows problems to be prepared directly and simply from either a block diagram representation or a set of ordinary differential equations. The program provides a basic set of functional blocks with which the components of a continuous system may be represented. It also accepts FORTRAN IV statements to handle very complex problems. The system has many features to allow the user to do a simulation run, and to concentrate on the phenomenon being simulated rather than the mechanism for implementing the simulation.

Biomedical Statistical Programs(BMD)

These programs were developed and distributed by the Health Sciences Computing Facility at the University of California at Los Angeles. The programs are arranged in seven classes:

- DESCRIPTION AND TABULATION
- MULTIVARIATE ANALYSIS
- REGRESSION ANALYSIS
- SPECIAL PROGRAMS
- TIME SERIES ANALYSIS
- VARIANCE ANALYSIS
- NEW PROGRAMS

A knowledge of computer programming is not required for the use of these programs but a knowledge of statistics relevant to particular programs is recommended.

FORMAC

This system is an extension of the PL/1 compiler which is used for symbolic manipulation of mathematical expressions (ie, differentiation). An expression may contain variables, user-defined functions, integer constants, symbolic constants, and functions such as SIN and COS. The expressions can be differentiated, compared, and replaced. Also, all of the normal features of PL/1 are available to the FORMAC user.

General Purpose Systems Simulator(GPSS)

This system is used to conduct evaluation and experiments of systems, methods, processes, and designs. Simulation is a technique to provide an effective means of testing and evaluating a proposed system under various conditions in a laboratory environment.

STATPACK

This is a system of statistical programs written in the APL terminal oriented language developed at the University of Alberta. Most of the standard statistical methods can be used, in addition to programs to solve linear programming, transportation and critical path problems. The user can use a remote typewriter terminal to access these programs and enter the data.

Synagraphic Mapping Program(SYMAP)

SYMAP was designed at Harvard University and is a system designed to allow city planners, geographers, and others to produce low cost graphic displays of spatial patterns using standard computer line printers. The advantage of the program are its speed, low cost, accuracy, and flexibility.

Student Monitor

A monitor program for student programs was designed and written at Lakehead University. It is capable of accepting student programs written in PL/1, FORTRAN, COBOL, ASSEMBLER, and ALGOL and processes these programs in a batch.

In this way, there is a saving of over 50% in the run times of the jobs.

Also, the system allows students to enter their own jobs into a card reader and obtain very fast turnaround.

APL Terminal System

A widely used teaching and research language is the APL programming language using remote typewriter terminals. The APL language is very different from any other language and is ideal for use in computer assisted instruction, statistical and mathematical programs, game playing programs (including business games), and many other applications. A set of teaching programs have been prepared in this language to allow a beginner to converse with the computer while learning the basic concepts of using the language. This can easily be extended to provide a conversational course in any discipline.

Experiments conducted at the University have shown that students at High School and Primary School level react very favourable to the use of this type of system.

To date many undergraduate students have made use of the APL system including all first year calculus students. For the coming year, the University students and faculty will be able to use the system on an all-day-basis.

Academic Computer Courses

Various Academic Departments provide courses in computer programming and computer systems. The Mathematics Department provides 3 Computer Science courses at the second, third, and fourth year level. The second year course is an Introduction to the Theory of Computer Science including a comprehensive coverage of the PL/1 language; the third year course covers Problem Oriented Programming Languages: a comparison of PL/1, FORTRAN, COBOL, ALGOL, and APL; the fourth year

course covers Machine Languages and Computer Organization. In addition, a new course in computer programming is available.

The Business Department offers a Diploma program in Computer Systems which includes: a first year basic computer course, a second year course in PL/1 programming, and a third year course in systems design.

The Computer Centre offers a number of non-credit service courses and seminars for students and faculty. Some of the courses are: introduction to APL, introduction to PL/1, the use of statistical programs, and FORTRAN programming. Courses are also being developed for presentation by television video tape utilizing typewriter terminals.

FORTRAN

COMPUTER LANGUAGES AVAILABLE

A large variety of computer languages are available for general use by faculty and students. The Computer Centre provides a consultation service for most of these languages.

A brief summary of the languages available at the Computer Centre follows:

PL/1 -

The IBM PL/1-F compiler is fully supported by the Computer Centre. Most of the Administrative Systems are written in the PL/1 language.

PL/C is an in-core PL/1 system developed at Cornell University. PL/C is a true subset of the IBM PL/1 compiler offering very fast compilation times with additional diagnostic and error correction facilities. Most of the University and High School student PL/1 programs should utilize the PL/C system. PL/C programs can be processed in a batch mode.

FORTRAN

The IBM Fortran IV level G and H compilers are available and are supported by the Computer Centre.

WATFOR is an in-core FORTRAN-IV system developed at the University of Waterloo. It includes most of the features of the IBM Fortran IV compiler and offers very fast compilation times with additional diagnostic facilities. All of the University and High school student FORTRAN programs should utilize the WATFOR

system. WATFOR programs can be processed in a batch mode.

COBOL

The IBM Cobol level U and F compilers are available but the Computer Centre does not provide full support for problems in COBOL programs. Users are encouraged to use Cobol level U.

ASSEMBLER

The IBM Assembler level F system is available and is fully supported by the Computer Centre.

HYPO is a basic one-address machine language and assembly language system and is fully supported by the Computer Centre. HYPO programs can be processed in a batch mode.

ALGOL

The IBM Algol compiler is available and is partially supported by the Computer Centre.

RPG

The IBM RPG (Report Program Generator) compiler is available but is not supported by the Computer Centre.

NOTE: A procedure has been set up to allow instructors the facility of the computer for the marking and analysis of multiple choice objective tests.

Any instructor who wishes to use this facility can obtain detailed information and the necessary materials from a member of Academic Services.

PROCEDURES FOR USING THE COMPUTER FACILITIES

A number of procedures have been set up to allow the Computer Centre to classify and record all of the jobs processed. If you intend to use the computer or data processing facilities in any way, the procedure which you should follow is:

- 1) Students who are registered in a course which involves the use of the computer require the approval of the course instructor. Other students who wish to use the computer should obtain the approval of the Department Head of their major subject.
- 2) Go to the Data Preparation section of the Computer Centre (Room MB-1047) and obtain a user account number. The function of the 7-digit number is to uniquely define all of the jobs of a particular user. The same account number is also used as an APL identification number.

The account numbers are coded to identify each Department and course (if required).

- 3) Obtain information regarding the preparation of job control cards.

If you are a student, this information should be obtained from your course instructor.

If you are a faculty member, the information can be obtained from a member of the Academic Services section of the Computer Centre.

4) If required, obtain advice regarding the use of a particular programming language.

Students should confer with their course instructor to obtain this advice.

Faculty members can obtain this advice and further consultation from a member of Academic Services.

5) Jobs to be processed on the computer may be submitted in the Data Control area (Room MB-1045B). Upon completion of the job, the output may be picked up at the wickets in the Data Control area.

Alternatively, the user may process his job using the Student Monitor. Under this procedure, the user may enter the Computer Room and following completion of his job, the output may be retrieved directly from the printer.

NOTE: Complete details on all of the procedures may be obtained from the Computer Centre Users Guide.

COMPUTER CENTRE LIBRARY

The Computer Centre maintains a library of Computer manuals, journals, and books in Room MB-1043C. Initially, the library was set up to serve the internal needs of the Computer Centre Personnel, but recently it has been expanded to provide reference materials to all of the computer users.

Procedures have been set up for allowing users to borrow materials from the library for short periods of time.

A brief resume of some of the materials available in the library follows:

IBM Reference Manuals on languages and systems.

IBM Programmed Instruction Manuals.

Various technical and non-technical computer journals.

Computer Science books.

Summary of Administration Systems

A large variety of Administrative Systems have been developed at Lakehead University for the Administrative Departments. The systems have been designed and written by the Administrative Department of the Computer Centre:

Resume of Administrative Systems

General Ledger: The General Ledger was the first system developed at the University and has been in operation for 3 years. The system includes programs to accept and edit data from cards or paper tape on a daily basis and programs to produce monthly reports giving a list of outstanding purchase orders, a balance sheet, and detailed Departmental reports.

Accounts Payable: In the Accounts Payable system, a transaction file of purchase orders is updated daily, invoices are processed on a weekly basis and cheques are printed. Facilities are also available for cheque reconciliation, and entries are made automatically into the General Ledger system.

Accounts Receivable: This is part of the Student Record System. Students are assessed payments and charges and reminder notices are produced for students. In addition, income tax receipts are produced for students.

Student Record System

This system has been re-designed and is scheduled for completion in August, 1970. The system will process and record student information through the periods of Admission, Registration, and course completion. Marks are recorded for each course and stored in a comprehensive history file. Graduating students' lists and marks are produced.

Payroll System

The Payroll System was implemented in January, 1970. The normal functions of printing cheques, a payroll register, and cheque reconciliation are performed. Automatic entries are made into the General Ledger System.

Space Inventory System

The Space Inventory System produces reports showing available space, non-available space, and assigned space. Lists are provided showing the location of every room and includes the characteristics of the room.

Management Information System

Work is currently under way to design a Management Information System which will allow Administrative personnel to use remote typewriter and display terminals for information retrieved and update facilities. The major administrative files will be incorporated into an integrated data base from which information may be extracted, related, deleted, changed, and put into report form directly from a terminal.

File Management System

MARK IV is a file management system capable of producing reports, creating and updating files and is designed for use by non-programmers. The system enables the user to extract information from an existing file or files and to produce many reports with only one pass of the file.

