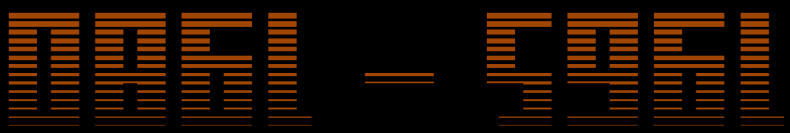
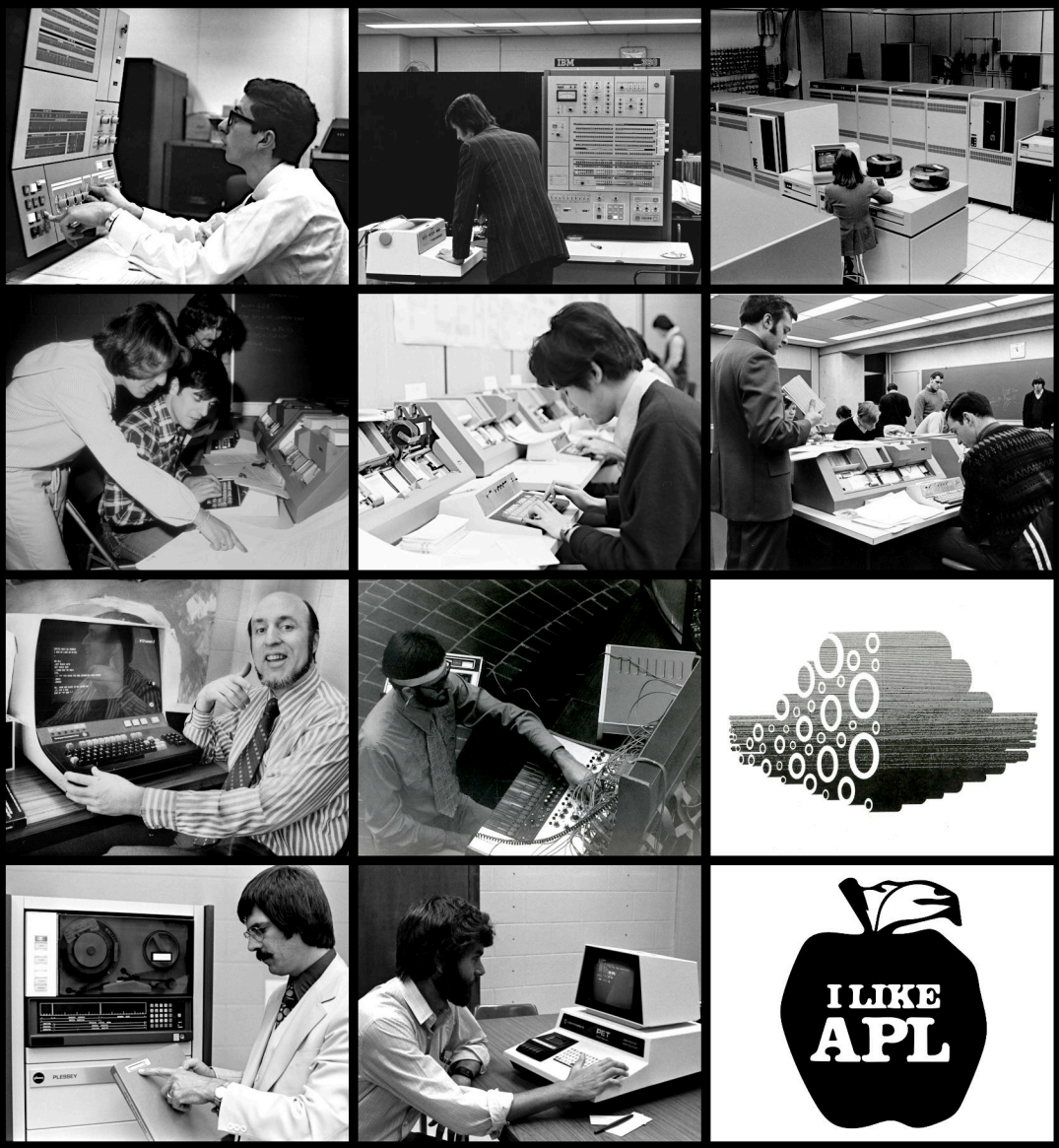
Computing at York

the beginning

exhibition catalog




IBM
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APL

introduction

York University was founded in 1959, amid a surge in demand for higher education in Ontario, driven by the rapid growth of its postwar population and economy. In a short period, several new or amalgamated universities were established across the province—from Trent University in the southeast to York and Waterloo in the center Lakehead in the northwest, and the University of Windsor in the west.

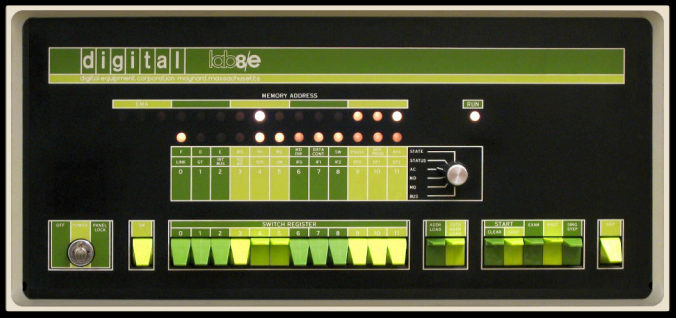
In 1959, the computing landscape in Canada was vastly different. Only 40 electronic digital computers were operational nationwide, with just three of them at universities. There were no established guidelines for developing academic computing resources or managing such resources effectively. Instead, academic computing environments evolved independently and at their own pace, shaped by local conditions and specific needs.

York began discussions on incorporating computers into its operations in 1964. Until then, the school had been focused on establishing itself as a viable postsecondary institution, forming new departments and expanding its infrastructure. In March 1965, the Senate's Executive Committee reported that:

> *After a careful university-wide analysis, it has become quite obvious that the forthcoming growth of York makes a suitable computer installation most desirable. The equipment will not only enable York to provide a service to all branches of the University community (academic, research, and administrative), but will also, in its own right, permit the conducting of research into the rapidly developing field of computer science.*

Shortly thereafter, the Senate, recognizing broader academic and administrative potential of computing, and moving away from viewing computers solely as advanced tools for numerical calculations, established the York University Computation Centre—the university's central computing facility—and the Department of Computer Science within the Faculty of Arts and Science.

Throughout the 1960s and '70s, the impact of computing technologies on academia was profound. Knowledge of what was possible was spreading fast through academic communities, that no longer viewed computers exclusively as sophisticated numerical processors and extensions of calculators for solving mathematical and scientific problems. Non-numeric applications of computing became as prevalent as number crunching. York University's initial forays into academic computing are both fascinating and emblematic of this shift and its impact. The university's computing heritage reflects the challenges and efforts involved in introducing computing to Canadian educational institutions as well as the enthusiasm and creativity that emerged from the use of computers across academic disciplines. The *Computing at York: the Beginning* exhibition provides a glimpse into this heritage.



The Digital Equipment Corp. PDP-8 (Lab8/e) computer installed by the Department of Psychology in 1971 was the university's first minicomputer.

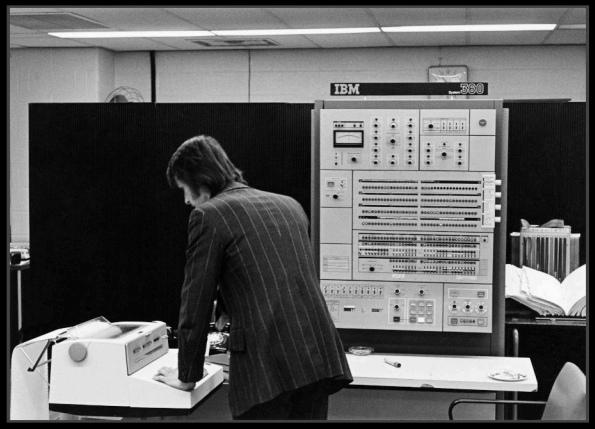
The exhibition covers the first 15 years of computing activities at York. It attempts to capture the spirit, curiosity, energy, and excitement that defined the early days of academic computing. It highlights the use of computer resources by York's artists, educators, librarians, researchers, and students, as they explored new frontiers in computer-supported research, education, and art.

The exhibition showcases a selection of objects from the York University Computer Museum and the Clara Thomas Archives and Special Collections. Various funds and archives within these organizations preserve captivating photographs that document computer use at the university. A curated selection of these images, along with vintage computer hardware once installed at York, offer insight into the early days of computing at the university, and a glimpse into York's evolving computing landscape.

The First Steps

The rising demand for computing resources, combined with the financial constraints of young universities like York made the development of an adequate computing infrastructure a persistent challenge. Initially, the university leased an IBM 1401 — a popular entry-level computer introduced in 1959. Yet by the time it arrived at York, IBM had begun rolling out its new 360 series, soon to dominate the computer market and solidify IBM's global leadership in the industry. Furthermore, it quickly became evident that the 1401 was insufficient for a large institution like York, unable to simultaneously meet the administrative, research, and teaching needs. As a result, it was replaced almost immediately—first by an IBM System/360 Model 30 in 1966, then a Model 40 in 1968, and a Model 50 just a year later with the understanding that the new computer, too, would not solve the computing problems for long and that processing of larger jobs would still need to be offloaded to outside computer facilities.

◀ York's IBM System/360 Model 30 computer at the Computation Centre, Steacie Science Library, 1966.



◀ One of York's IBM System/360 Model 50 computers at the Computation Centre in the Steacie Science Library, c. 1970.

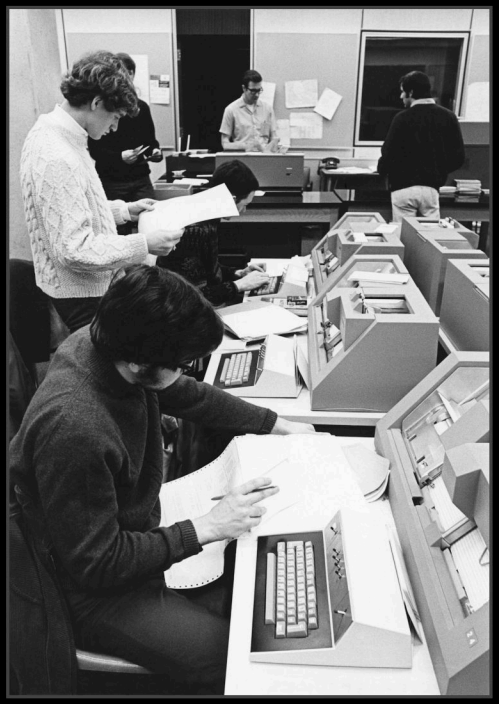
From its inception in 1965, the Computation Centre, located in the Steacie Science Library, assumed responsibility not only for supporting the computational needs of the York community and staying current in the fast-evolving frontier of academic computing, but also for promoting computing across the university. It provided programming support for researchers and students, as well as for computer art and music activities. The Centre organized users meetings, technical seminars, and training courses. It screened educational films, published user guides, reports, and newsletters.

York's computing infrastructure challenges were largely resolved in November 1971 with the installation of an IBM System/370 Model 155, later supplemented by several minicomputers, including the Digital Equipment PDP-8, Interdata 70, and VAX-11/780.

The Centre for Research in Experimental Space Sciences (CRESS) was one of the earliest and most intensive users of York's computing facilities and played a key role in shaping the development of computing at the university. Other early adopters included the Institute of Behavioral Research, the Departments of Music and Psychology, the Faculty of Administrative Studies, and the Libraries.

By the end of the 1970s, York's computing landscape had transformed dramatically. The centralized resources were now complemented by minicomputers operated by various departments, and a rapidly growing number of personal computers installed in research and administrative offices, as well as student labs across all campuses.

Computer Labs



▲ Students in a York computer lab working with punch card equipment, a standard approach to programming in the 1960s and '70s, 1976.

Beginning in the early 1960s, academic institutions worldwide had begun adopting computing technologies on a large scale. It was also becoming increasingly clear that proficiency in using computers and software applications would be essential in a rapidly evolving, technology-driven world. In this climate, the York Senate established the Department of Computer Science within the Faculty of Arts and Science in 1965 and, in the following year, the Department of Mathematics and Computer Science at Atkinson College. Computer and calculator labs were also created to support both the newly created and existing programs. These labs—providing access to computing resources along with educational and technical support—quickly became essential infrastructure, enabling teaching, scientific discovery, and innovation across a wide range of disciplines.

Early computer laboratories at York were more than just shared physical spaces, offering access to the university's computing resources. They quickly became integral to the academic experience, fostering digital literacy through hands-on engagement, serving as hubs for learning, innovation, and collaboration. These labs often functioned as communal spaces where students worked on group projects, shared ideas, and solved problems collectively.

During the first decade of computing at York, computer labs were primarily equipped with keypunch machines — early data entry devices used to store data and programs on IBM punch cards. These cards were small, thin, sheets of stiff paper designed to store information in the form of small holes punched in specific positions. Different patterns of holes on a card encoded different digits or characters used to represent data or program instructions.

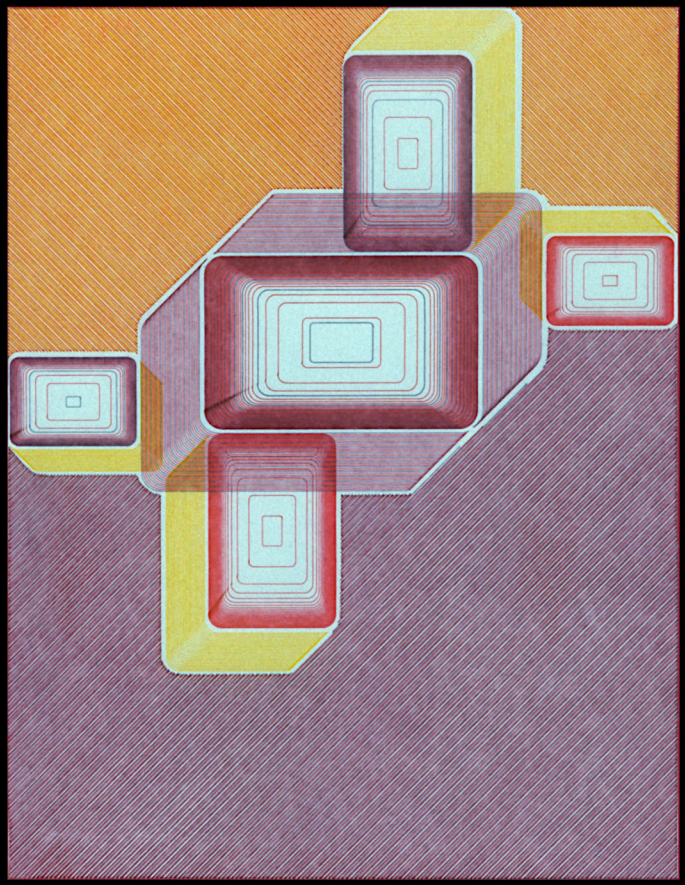
York students and faculty regularly lined up at the university's Computer Centre to have their decks of punch cards fed into the Centre's IBM mainframe for execution. In 1966, York's IBM System/360 Model 30 ran three times a day to execute non-administrative work.

However, storing programs on punch cards came with challenges. Typing errors or bugs in the code were often only spotted after reviewing the output. If mistakes were found, the entire process—including punching a corrected deck of cards—had to be repeated from the beginning.

▲ Students using keypunch equipment to transfer computer programs onto IBM punch cards in a York computer lab, 1976.

Students reviewing computer printouts in a Ross Building computer lab equipped with terminals connected to a shared mainframe
▼ computer, c. late 1970s.

Computer Art

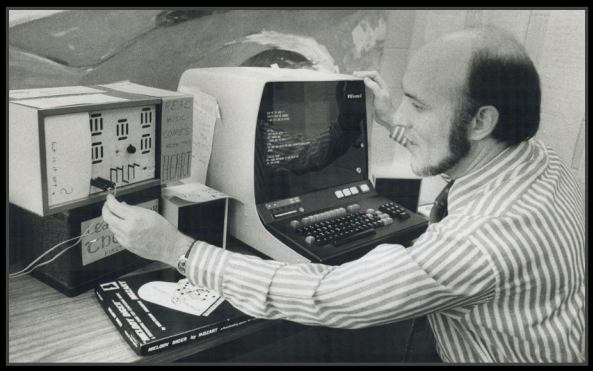


Early computer-assisted art of the mid-20th century emerged at the crossroad of technology and creativity, shaped by collaborations among computer scientists, mathematicians, and artists who explored the potential of computer technologies for artistic expression. Like many universities worldwide, York played an active role in this pioneering movement, providing resources, technical expertise, and an environment that fostered experimentation and interdisciplinary collaboration in developing new forms of visual art and music.

◀ *Boxes* by Will Anielewicz, 1978.

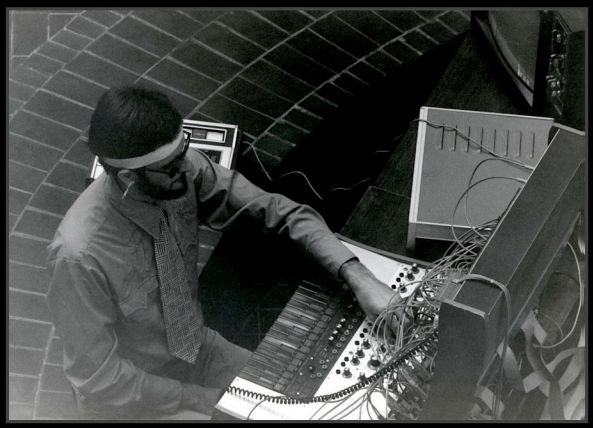
Established in 1969, York University's Department of Music quickly emerged as a center of innovation, offering technological resources (such as the Electronic Media Studios), a stimulating intellectual environment, and its commitment to interdisciplinary collaboration in advancing the use of computing in composition, performance, and music theory. Among the key figures shaping the department's progressive agenda were Sterling Beckwith, the founding chair; David Rosenboom, a pioneer in experimental brainwave music; and James Tenney, a renowned composer-theorist.

York's mainframe computers—installed primarily to support research, education, and administrative tasks—were repurposed to generate visual artwork once plotter devices became available. Beginning in 1971, the *York University Computation Centre Users' Newsletter* and other York publications, featured computer-generated graphics created by York students, most notably by a computer science student Will Anielewicz.

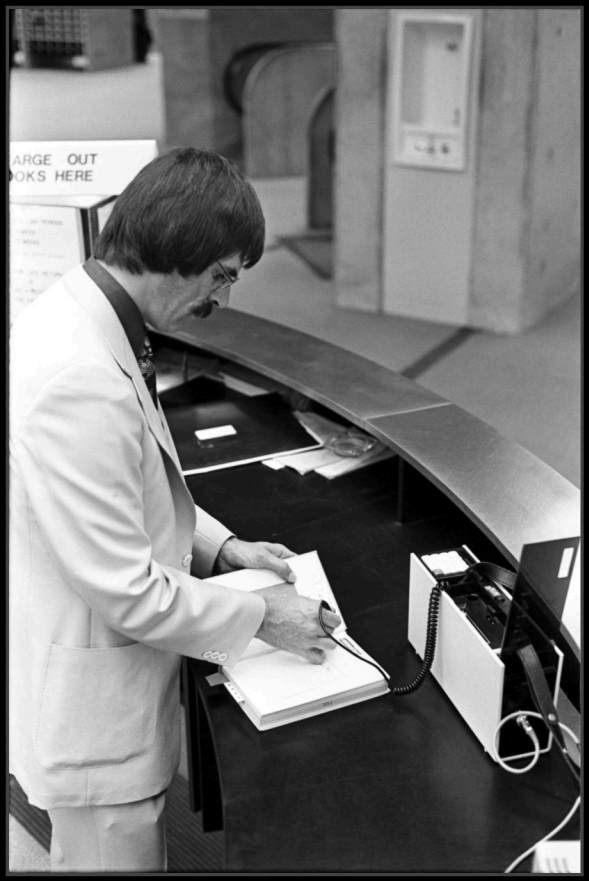


▲ Sterling Beckwith in front of the Interactive Music Project workstation in the Department of Music, 1974.

David Rosenboom performing *On Being Invisible* using his
▼ "brainwave" computer/electronic system in 1978, Mexico.



Libraries & Data



A core feature of any library circulation system is the ability to record information about borrowed items and their borrowers. York Libraries began automating circulation functions shortly after the installation of the university's first computer in 1966.

Initially, the Libraries used electro-mechanical Demco charge-out machines, but by the end of the 1960s, the search was underway for a more automated system compatible with the IBM hardware at the Computation Centre.

In 1969, York installed such a system using Source Record Punch machines as input devices.

◀ A York librarian operates the Plessey S.P.C. Library Pen System installed in the Scott Library in the mid-1970s.

Processing

To check out a book, the user's ID stored on a machine readable ID badge issued to each library user and the due date were processed with the push of a "punch" button, transferring the information onto a transaction card. These cards were collected throughout the day and sent in batches to the Department of Computer Services (formerly the Computation Centre), where they were used to update circulation records and generate statistical reports on a daily, weekly, and monthly basis.

The card catalog remained a fixture of York Libraries until the mid-1970s, when the Plessey S.P.C. Library Pen System was installed at the Scott Library. The S.P.C. was York Libraries' first light-pen-based system, offering a fast and accurate method for recording circulation data and transferring it to the Department of Computer Services for updating transaction records and maintaining the catalog of subjects, titles, and authors — all of which were accessible online within the library.

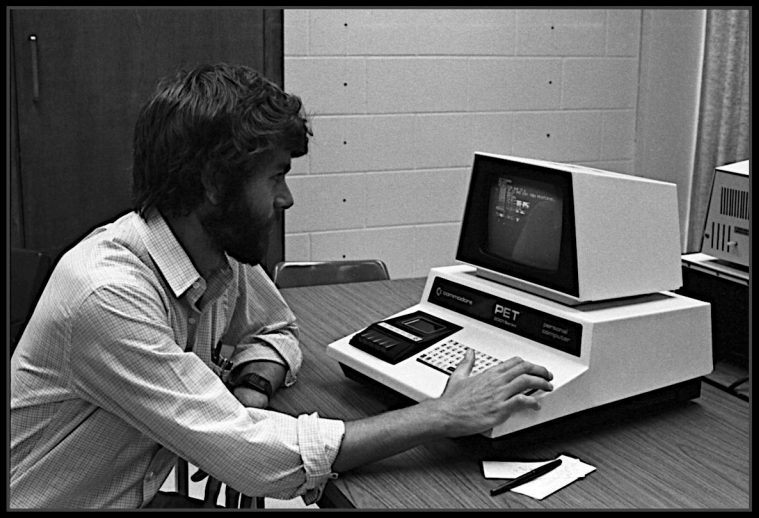
◀ A York librarian operates the Plessey S.P.C. Library Pen System installed in the Scott Library in the mid-1970s.

The PC Era

The introduction of microprocessor-powered desktop computers (PCs) into academia in the late 1970s marked another transformative moment in the history of academic computing. Outfitting every office and laboratory with a minicomputer was economically impractical, but equipping them with personal computers proved both feasible and cost-effective. This shift fundamentally changed how academic institutions approached teaching, learning, and research.

The first personal computers—Apple][s, Commodore PETs, the Canadian-made Arisias, and many other models—began appearing in offices and laboratories across York campus as soon as they became commercially available. Their adoption enabled an increasing number of administrative and research tasks to be carried out more efficiently, reducing dependence on the university's centralized computing facilities.

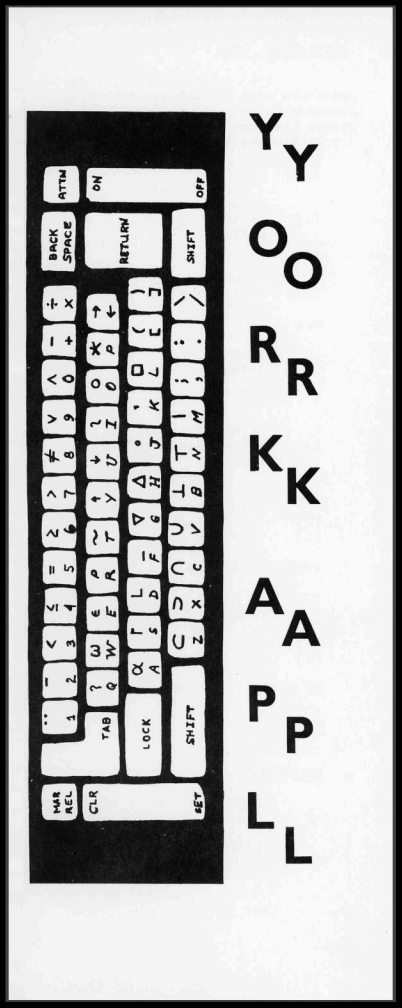
The rapid expansion of PC use across diverse applications required students to develop a solid understanding of microcomputer technology and the emerging personal computing paradigm. In response, microcomputer-related courses were introduced, and the first PC labs were established. These labs offered a new level of interactivity and accessibility in learning, while also opening up avenues for social interaction through online services that provided access to email, forums, news, and many other digital resources available to PC users.



◀ A researcher operating a Commodore PET microcomputer in the Off-Center for Microcomputing lab at the Calumet College, late 1970s.

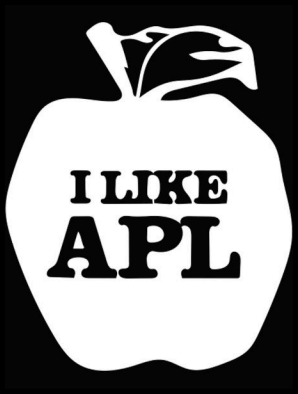
◀ A student playing *Sabotage* game on an Apple][computer in the Steacie Science Library microcomputer lab, 1982.

APL at York

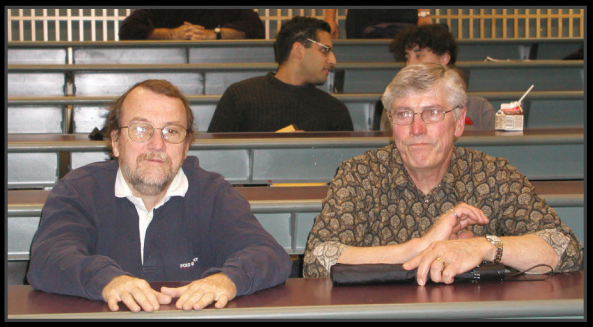


The APL programming language, developed by IBM in the late 1960s, was based on a unique mathematical notation created by Kenneth E. Iverson, a Canadian computer scientist, recipient of the prestigious 1979 Turing Award, and honorary doctorate from York University in 1998. By the early 1970s, APL was offered by most major computer manufacturers. The language was considered concise, powerful, and relatively easy to learn and use.

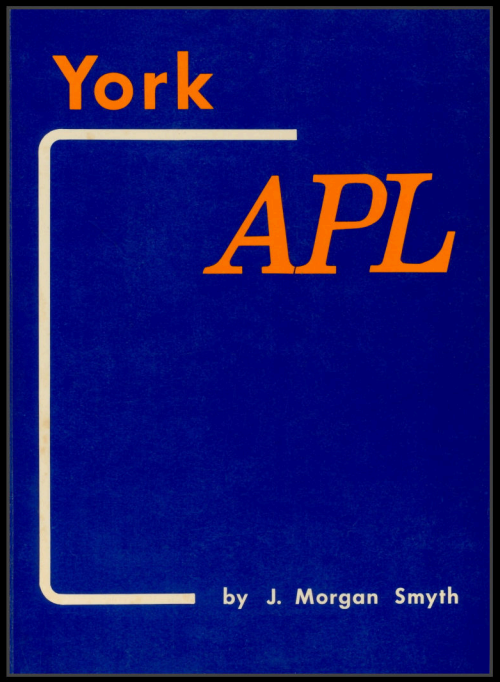
The language inspired a vibrant cultural movement, complete with conferences, publications, interest groups, and even "I Like APL" stickers, buttons, T-shirts, and songs celebrating its impact.



York APL developers and former York University Computation Centre employees Gordon Ramer and Don Genner attending a computer history seminar at York in 2001. ▶



Morgan Smyth was one of the earliest users of York APL. He documented the language in his 1972 book *York APL*. ▼



Despite APL's appeal, many organizations with mid-range computers could not afford to install it, as its substantial computational resource requirements exceeded the capabilities of such systems. To address this limitation, Gordon Ramer, an assistant director of the York University Computation Centre, developed a dialect called York APL, designed to run on IBM mainframes with modest memory. Ramer implemented the language with the assistance of fellow Centre employee Don Genner. Memory efficiency and other unique features of York APL, such as a range of I/O facilities, attracted the attention of several North American and European universities and research institutions to the language.

Although APL has been superseded by newer programming languages, it remains under active development. Companies like Dyalog continue to advance the language, offering products that integrate modern technologies while preserving traditional APL functionality.

Presented by

The Computing at York: the Beginning exhibition is organized by the York University Computer Museum (YUCoM) and the York University Libraries. It is made possible by corporate and individual sponsorship from Dyalog Ltd., Gitte Christensen and Morten Kromberg of Insight Systems Holding, Lee Lau, co-founder of ATI, and the Office of the Vice-President Equity, People and Culture, York University.

Corporate sponsorship of technology museums represents a symbiotic alliance between technology firms and cultural institutions. These companies play a pivotal role in providing essential funding to ensure the ongoing preservation and presentation of technological heritage to diverse audiences. The support of the exhibition from Dyalog Ltd., the world leader in developing APL software infrastructure, and from Insight Systems Holding is particularly significant. Their commitment to promoting the APL programming language and preserving its heritage strengthens the museum's efforts to preserve APL history through its collections and to document the language's role in academic computing.

This catalog is published in conjunction with the *Computing at York: the Beginning* exhibition organized by the York University Computer Museum and the York University Libraries. The exhibition opened in the Scott Library, York University, in November 2025.

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