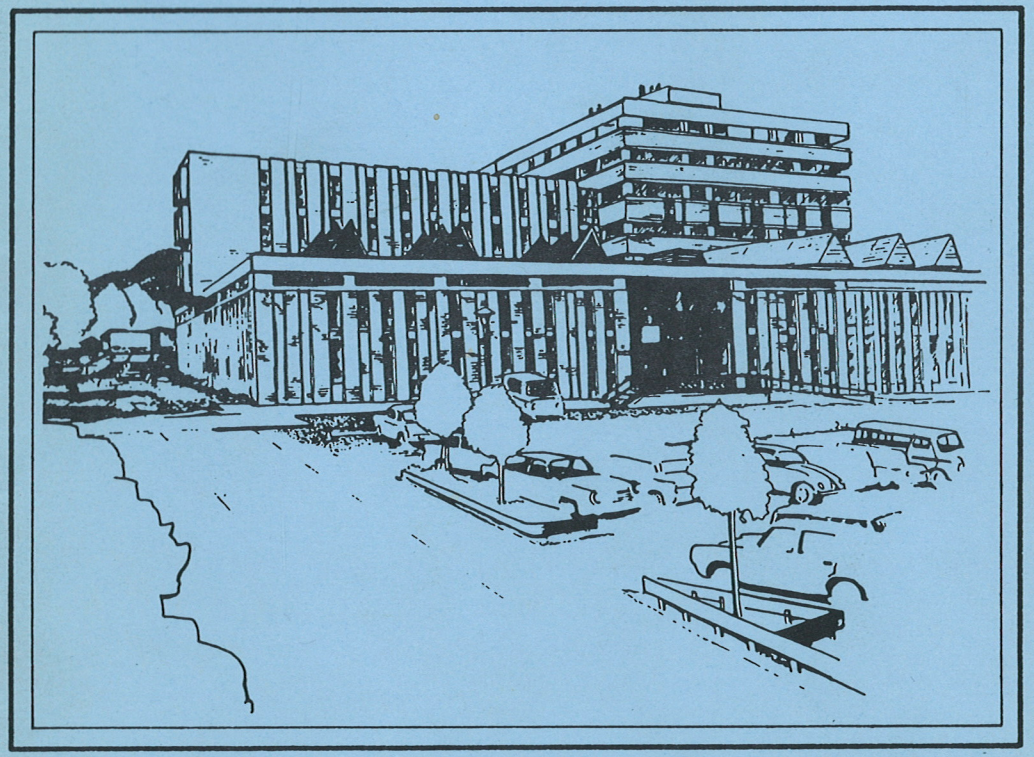
A History of the Edinburgh Regional Computing Centre (ERCC)

Arthur G. Wilson



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THE MAJOR ACHIEVEMENTS OF THE ERCC

1. INTRODUCTION

The aim of this report is to record the achievements of the Edinburgh Regional Computing Centre (ERCC) since its inception in 1966 to January 1986. I used the first version as a project for an examination I was taking in Technical Communication Techniques. It was suggested that I should extend the first version and present it to the former Director of the ERCC, Dr G.E.Thomas, as a memento of his 19 years as the first Director of the ERCC.

The information contained in this report is based on the Flowers Report (see para 2(1)), the ERCC Annual Reports and interviews with senior members of staff.

(1) The Facilities and Services Provided by the ERCC

The ERCC provides the following computing facilities:

(a) interactive and batch computing on two ICL 2900 mainframe computers;

(b) computing on the ICL Distributed Array Processor (DAP) which is attached to the ICL 2976 mainframe computer;

(c) computing on a VAX/750 computer;

(d) a Local Area Network (LAN) called EDNET which allows users in the Edinburgh area to access a number of local and remote host computers;

(e) a micro computer laboratory which can offer the user various micro computing facilities on a number of micro computers.

To support users of the above facilities, the ERCC provides the following services:

(a) advice on any problems with the computing facilities described above;

(b) information (both imported and locally produced) on the facilities described above;

(c) training on the software that runs on the various ERCC mainframe and micro computers;

(d) planning advice on the departmental purchase of equipment and connection to EDNET;

(e) administration of maintenance arrangements on departmental equipment.

(2) Who Uses the Facilities and Services Provided by the ERCC

The function of the Centre is to provide computing facilities and services for Edinburgh University users. With the advent of extensive computer networking, the Centre's facilities can be accessed by computer users on many major national and international computer networks.

The main groups of users are as follows:

(a) undergraduates;

(b) researchers working in the University and with Research Councils;

(c) university staff who need computing facilities to help them in their day-to-day jobs;

(d) staff, students and research workers from various national and international universities and research establishments;

(e) staff and research workers with various government institutions;

(f) staff from a small number of commercial companies.

The piecharts in figure 1 show the utilisation of the two ICL mainframes by Edinburgh University and Research Council users for the year 1983/84.

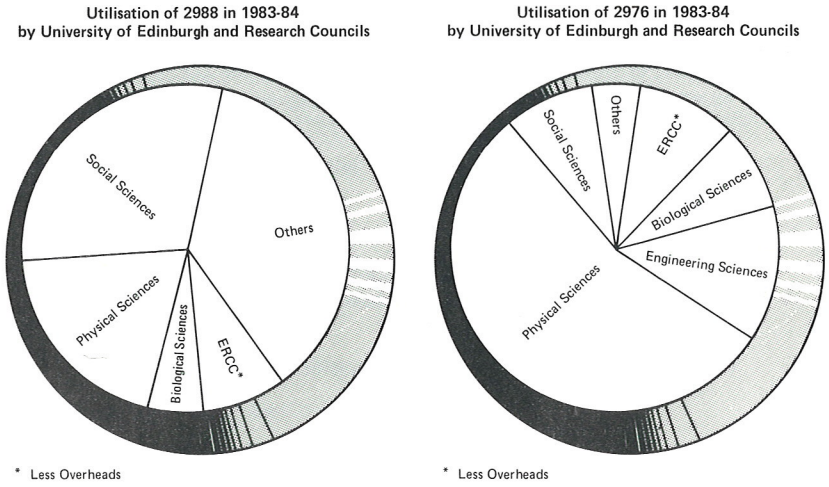


Figure 1: The utilisation of ERCC resources

(3) The Organisation of the ERCC

Because the ERCC provides a variety of services, there are a number of groups who support various functions. Some of these groups have direct contact with the users (these are called foreground groups), while others do not (these are called background groups). These foreground and background groups interact to provide the users with the facilities and services they require. The diagram in Appendix I illustrates the organisation of the ERCC.

(4) The Management of the ERCC

The management is illustrated in Figure 2 below.

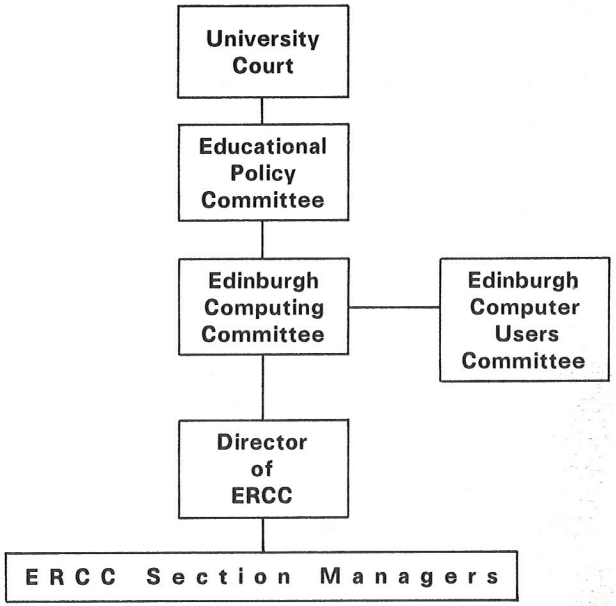


Figure 2: The Management of the ERCC

The Director is a member of the Edinburgh Computing Committee (ECC) which could be likened to a board of directors. It determines policies on the nature of services to be provided. It bases its decisions on the funding available, which comes from: the Educational Policy Committee (EPC); the Computer Board (the government body which gives universities money to purchase equipment) and the sale of ERCC services.

The Edinburgh Computer Users' Committee (ECUC) acts as a two way channel for communication between the ECC and the individual users. The ECUC keeps the users informed about the policies being adopted by the ECC and advises the ECC on user requirements and expectations.

2. THE BIRTH OF THE ERCC

In the early sixties, computers were being used in some American and British universities for the analysis of large amounts of information. In 1964 Edinburgh University was allocated 15 minutes computer time per day on the Atlas computer at Manchester University. This allocation was used by a growing body of active computer users and it was recognised that the University needed a computer of its own. A number of other universities also displayed the need for computing facilities and eventually the Government decided that their needs should be looked at by a working party.

(1) The Flowers Report

In 1966 the Minister of Technology asked the Council for Scientific Policy and the University Grants Committee to set up a working party to undertake a full scale review of the computer requirements of universities and research councils. The working party was chaired by Professor Flowers of Manchester University and the report it produced has come to be known as *The Flowers Report*. The full name of the report is *A Report of a Joint Working Group on Computers for Research* and it was presented to Parliament in January 1966.

The Report recommended that every university should have a computer laboratory and that some should have the role of a Regional Computer Centre. The designated Regional Centres were London, Manchester and Edinburgh which were to provide computing services for local university users, surrounding research council establishments and other universities.

(2) Recommendations in the Report affecting Edinburgh University

For Edinburgh University, the recommendations were:

(a) A major installation was required.

(b) Because of the dispersion of the potential computer users, the ERCC should be built along multi-access lines.

(c) There should be some co-ordination between Edinburgh, Aberdeen and St. Andrews Universities as part of the regional nature of the Edinburgh installation.

(d) Edinburgh should take a leading role in the development of conversational systems as a matter of national importance.

(e) It was noted in the report that one particular company had shown interest in the development of an interactive system and it was recommended that discussions should start between the University and that company.

(3) The Establishment of the ERCC

Dr G.E.Thomas was appointed director of the ERCC in June 1966 and the ERCC came into formal existence in August of the same year. Articles from the national press detailing his appointment are shown in Appendix II.

Following the appointment of the Director, a five year plan for the development of the Centre was worked out.

The main computer service was to be based on an English Electric 4/75 computer which would be delivered in September 1968. As a temporary measure, a KDF9 computer was rented and installed in a building at Buccluech Place Lane. An article from the Computer Weekly describing this installation is contained in Appendix II.

Between the appointment of the Director in June 1966 and the delivery of the 4/75 computer in September 1968, the ERCC established itself as the provider of computing facilities for Edinburgh University and local research council estabishments: the ERCC was born and was beginning to grow.

The ERCC planned to employ 152 members of staff by 1970, and by the publication of the ERCC Second Annual Report in July 1968, 108 were in post. A list of what we might call *Founder Menbers* in post in July 1968 is given in Appendix III.

3. THE GROWTH OF THE ERCC

From its birth in 1966 to when this report was written, the ERCC has grown considerably. I have searched through old documents to see if I could illustrate this growth and I decided that the best way would be to show the growth in the number of users of ERCC resources. I also decided to show the growth in the number of user departments, although this is closely linked to the growth of the registered users. The growth is illustrated in figure 3 below.

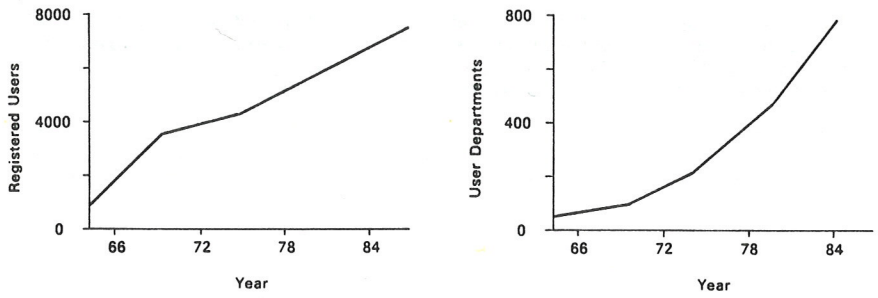


Figure 3: the growth of the ERCC.

Today the Centre employs 180 people. It provides services and facilities for 751 registered user groups and has 7,878 registered users of its computing facilities.

The range of facilities and services has also grown over the years. The Centre initially offered computing on one single mainframe, it now offers; computing on a number of different mainframes, micro computing, networking etc.

THE MAJOR ACHIEVEMENTS OF THE ERCC

Throughout its short history, the ERCC has been at the forefront of university computing and has always been willing to pioneer new equipment and concepts.

The conversational computing project described in the Flowers report, attracted a number of high calibre personnel who have remained with the Centre since its birth. They have been instrumental in most of its major achievements, some of which are described in the rest of this section. Appendix IV summarises details of these achievements along with their dates.

4. AN INTERACTIVE COMPUTING SERVICE ON THE ICL 4/75 COMPUTER

The ERCC was identified in the Flowers Report as a suitable computing Centre for the development of an advanced multi-access operating system. For this reason, the Edinburgh Multi-Access Project (EMAP) was started and between 1966 and 1970 a joint team of staff from English Electric, subsequently International Computers Limited (ICL) and the department of Computer Science at Edinburgh University worked on developing such a system.

Prior to EMAP, all processing on the KDF9 was done in batches, this was cumbersome and time consuming. Producing input for and getting output from such a system entailed the following:

(a) punching up each computer command on an 80 column cardboard card or continuous paper tape;

(b) filling in a job control sheet, to tell the operator the hardware and software needed to run the job;

(c) taking the deck of cards or paper tape reel and the JCL sheet along to a reception point and giving it to a member of the operations staff.

The deck of cards or paper tape reel would be placed in a queue and run on the computer when its turn came. When the job was complete, the results would be listed on a line printer. The operator would remove this listing and place it in the reception point along with the deck of cards or paper tape reel.

Sometimes the above steps took days and at the end of it there was no certainty that the results would be what was expected.

The theory of conversational processing was that users could type in their problem and get a result almost immediately.

The EMAP team produced a conversational system which could support a small number of users (8-10) simultaneously. Unfortunately, the service the users received was inadequate because:

(a) the system was unfinished;

(b) it was heavily handicapped by having to provide all the facilities of the ICL MULTIJOB system as well as its own features;

(c) ICL became involved in other projects and by the end had no interest in EMAP.

The project was officially abandoned in 1970, but, fortunately a few people in the Centre and the department of Computer Science still had faith in the concept of multi-access conversational processing. One of them was the late Dr Gordon Burns who prompted a small number of staff to develop a workable system for the System 4/75 computer. So, in the Autumn of 1970 a small team of individuals joined together and formed the Edinburgh Multi Access System (EMAS) Project Team. Prominent among the people who contributed to the project (some only part time) were Stephen Hayes, Geoff Millard, David Rees, Peter Stephens and Alec Wright. Together they salvaged the best parts of the EMAP system, removed some of the ICL marketing extras and had a reliable service working on the ICL 4/75 computer by October 1971: the role given to the ERCC in the Flowers report had been fulfilled.

5. SATISFYING THE NEEDS OF THE EDINBURGH USERS

The ERCC had not only to function as a development Centre, but it had also a duty to provide a reliable computer service for users in the Edinburgh University community. This it did initially on the KDF 9 machine based in Edinburgh and by sending work down a Remote Job Entry (RJE) link to Northumbrian Universities Multiple Access Computer (NUMAC) which operated an IBM 360 computer. Both these services were stopped in early 1969 when the ERCC was given an IBM 360/50 machine of its own. This meant that the ERCC could control its own service machine without having to depend on other universities or computing centres.

It was in these early years that the ERCC encouraged university departments and research institutes to use the computing facilities and services that the ERCC could provide. They all found that in addition to providing the necessary hardware and software, it also provided:

(a) advice on purchasing equipment;

(b) advice on computer projects;

(c) help on day to day computer problems.

The IBM 360/50 had a considerable amount of disc space which allowed the storage of large amounts of information. This was quickly utilized by the Social Science users who used it to store large quantities of survey and other information which they could manipulate with the statistical programs and packages. At the same time, many other groups of users were becoming aware of the potential in computing and with the help of the ERCC, soon established themselves as computer users.

The ERCC subsequently improved its services in two major steps:

(a) A new ICL 4/75 computer was purchased and used to increase the EMAS 4/75 service. This doubled the number of interactive users the machines could handle at one time.

(b) The IBM 370/155 computer was upgraded to an IBM 370/158. This increased the amount of batch jobs that could be run and the amount of file space users could have.

The increasing number of users showed that the ERCC was satisfying the needs of the computing community in and around Edinburgh University. This discouraged individual groups from attempting to provide their own computer service as had happened in other universities.

Hence, as recommended in the Flowers report, the ERCC became the main provider of computing services for users in the the Edinburgh University community: another major achievement.

6. AN EMAS SERVICE ON THE ICL 2900 COMPUTER

In the early 1970s, ICL had been developing the new 2900 range of computers. The ERCC intended to purchase the 2980 computer which would run an ICL operating system called Virtual Machine Environment (VME) and would offer a combined batch and interactive service.

(1) The First ICL 2900 Machine

The ICL 2980 computer was due to arrive in July 1975. Unfortunately, the government of the day decided that the European Space Agency had more need of the machine and decided to let them have the first one. As a consolation, the ERCC was given an ICL 2970 computer. This was meant as a short term substitute for the ICL 2980 and no official service was run on it. Most of the time it was used by ICL for testing the new ICL 2900 software and by the ERCC for developing and testing new compilers which would be used on the ICL 2900 operating systems.

(2) EMAS Development on the First ICL 2900 Machine

In July 1976, the EMAS Project Team successfully tested EMAS on the ICL 2970 machine. They then started developing a new operating system called *EMAS 2900*. This was based on *EMAS 4/75* but with the following improvements:

(a) more RJE facilities;

(b) a larger address space;

(c) less operator involvement.

(3) EMAS Service on the ICL 2970

The test of the EMAS 2900 operating system proved successful and in April 1978 a pilot service was launched on the ICL 2970 machine. This system provided a reliable service for up to 20 simultaneous interactive users and was offered as a major service in October 1978.

(4) The Installation of the ICL 2980 Machine

The original 2900 machine promised to the ERCC was a 2980; this was eventually delivered in July 1976. As mentioned before it was to support a combined interactive and batch service using an operating system called VME. Eventually a batch service was mounted and managed to handle the Edinburgh load, but, on the interactive side, the system could not provide a reliable service.

(5) EMAS Tests on the ICL 2980

In the middle of 1978, the EMAS software team started testing EMAS on the ICL 2980 computer. The machine was compatible with the 2970 machine but almost four times more powerful. The test proved to be a success and because of the failure of the VME system to provide interactive computing, a change of system was considered.

(6) An EMAS Service on the ICL 2980

EMAS on the 4/75 and 2970 computers was an interactive system although it could handle a small amount of batch work. The new system being developed for the 2980 would have to handle a larger amount of batch work as well as providing an interactive service. After intensive development work, a service was mounted on the 2980 which could:

(a) handle over 100 simultaneous interactive users;

(b) run batch work ranging from 5 minute jobs to 2 hour jobs.

At last the Edinburgh users could make full use of the ICL 2980 computer.

(7) The Replacement of the 4/75 Computers by ICL 2972 Computers

By the end of 1978, the 4/75 system had been in operation for over ten years. The Computer Board had agreed that the ERCC was justified in asking for new computers and they granted funds to purchase a suitable system.

It was decided that the replacement system should run an EMAS service similar to the one which had been successfully mounted on the ICL 2980 machine, accordingly another ICL 2900 machine was purchased. This time it was decided by the ERCC, ECC, ICL and the Computer Board, that a dual ICL 2972 computer would be the most suitable. So, in the summer of 1979, the two ICL 4/75 machines were dismantled and a new Dual 2972 system installed. In August 1983, this system was upgraded to a Dual 2976.

(8) An EMAS Service on the Dual ICL 2972 Computers

Two weeks after the installation of the dual 2972 machine, an EMAS service was successfully mounted. After further development the service was extended to handle the massive communications traffic and within a few months was supporting over 100 users and a number of batch jobs.

(9) EMAS 2900: The Service for the 1980s

Since 1979, EMAS 2900 has been the main operating system used in the ERCC and it is expected to be the main service vehicle until the 1990s.

The University of Kent at Canterbury has also found that EMAS is suitable for university computing; since 1979 they have been running an EMAS 2900 service on their ICL 2960 computer.

(10) The Future of EMAS

The 2980 computer will be scrapped in 1987, and already EMAS is being developed for an AMDAHL V7 computer. This machine along with the dual ICL 2976 system will provide an EMAS service into the 1990s. After these two machines have gone, EMAS may live or it may die, its future may well depend upon:

(a) whether the successor to Dr Thomas will be as firm in support of it;

(b) a continued interest in it by Peter Stephens, its principal architect;

(c) the appearance of a compatible commercial system in the 1990s. It was the lack of a such a system in the 1970s and 1980s which resulted in the continuance of EMAS.

7. ACHIEVEMENTS IN THE FIELD OF DATA COMMUNICATIONS

The ERCC has one of the largest data communication networks in the national university network. This has grown over the years mainly due to the following reasons:

(a) The brief given to the ERCC in the Flowers report stated that there should be some co-ordination between Edinburgh, Aberdeen and St.Andrews Universities as part of the regional nature of the Edinburgh installation. The ERCC took this to mean that they were to share computing services with local universities and it developed communication links with them.

(b) As far back as 1968, the ERCC had an RJE link to NUMAC. This meant that the ERCC had data communication experience at an early stage in its history.

(c) The staff of the ERCC also gained data communication experience through the EMAS system which needed the development of communications software.

(d) The ERCC facilities and services are distributed between two main sites, they are:

- Central Area located in the centre of Edinburgh;
- Kings' Buildings located 4 miles from the Central Area,

This meant that data communication links had to be set up between these main sites and other university and research council establishments which were scattered around the Edinburgh area.

(1) The Edinburgh Communications Computer

In the early 1970s, the ERCC decided that if it wanted to have a communications network, it needed a communications computer. For this reason it was given funds by the Computer Board to purchase a MODULAR ONE computer. This computer would control a number of data communication links to and from other computers in and around and even remote to Edinburgh University. The machine was called the Edinburgh Node. The illustration in Figure 4 shows the role of this machine.

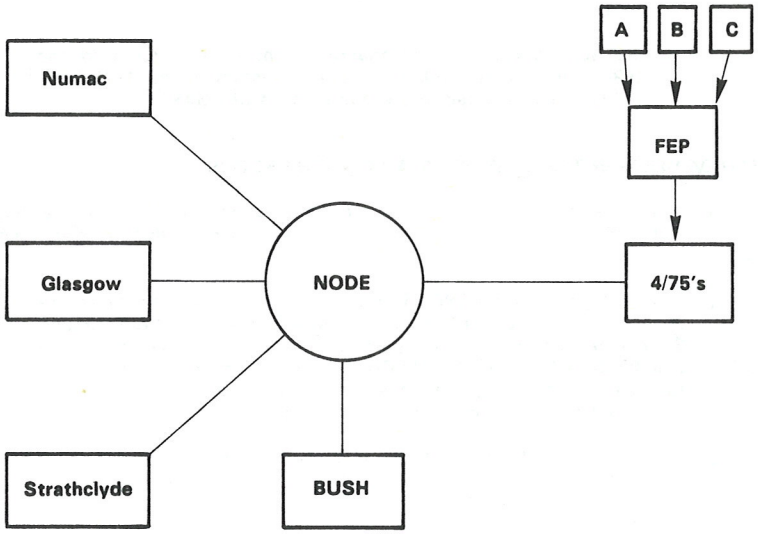


Figure 4: The Edinburgh Node Computer

(2) The Joint Network Team (JNT)

At the same time as the node machine was being requested, the JNT was set up to recommend what should be done about inter-university communication and to set up data communication standards.

(3) The Regional Computing Organisation Network (RCOnet)

An RJE network was set up in 1969 to allow Glasgow, Strathclyde and Edinburgh universities to access the IBM service. When this was replaced by the ICL 2980 service, the RCOnet was set up. At the heart of this network was the Edinburgh Node computer; the diagram in Figure 4 above shows what the RCOnet of the mid 1970s looked like.

(4) The Local Communications Network

While the RCOnet was expanding, the local Edinburgh network built around the EMAS 4/75 system was also expanding. This was being used by up to 90 simultaneous interactive users and all of these had to be handled by a local communications network which consisted of a Front End Processor (FEP), several Terminal Control Processors (TCP) and a number of workstations. The local network of the mid 1970s is illustrated in Figure 5.

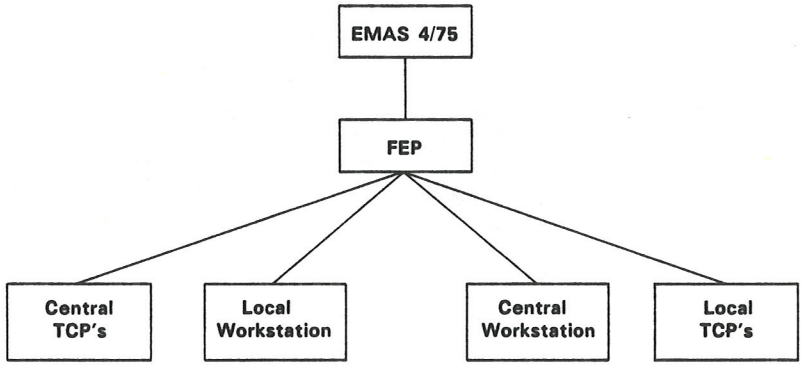


Figure 5: The Local Communications Network

(5) The Amalgamation of the Local and Regional Network Teams

In 1979, it was decided that the two network teams should be joined together to form an ERCC network team. They then proceeded to build up the local Edinburgh network and expand the links to other computer networks throughout the country and the rest of the world. The main links would be through the Scientific Research Council Network (SRCnet) later renamed SERCnet.

(6) The Growth of Communications Since the Amalgamation

One of the first moves of the Network team was to develop a Packet Switching machine. This machine allowed Edinburgh users to access the British Telecom Packet Switching Network (PSS) which in turn allowed access to a number of other national and international networks. A number of other developments have taken place in such areas as Local Area Networking, Cambridge Ring communications and many others.

(7) The Joint Academic Network (JANET)

In 1982, SERCnet was expanded to include a number of other university local networks and renamed the Joint Academic Network (JANET). This network allows users on local university and research council networks to access the computing facilities of most national academic institutions.

Today the ERCC has a network called, EDNET, based on 3 large X25 packet switches supplied by GEC Computers Ltd. This allows any Edinburgh user, with a computer terminal attached to this network, to access any local HOST computer. It also has gateways out to JANET and the PSS networks, so allowing access to many other national and international networks. A diagram representing the EDNET network is shown in Figure 6 on the opposite page.

When the Flowers report was written, I am sure it was never envisaged that the regional role given to Edinburgh would result in such an advanced computer network.

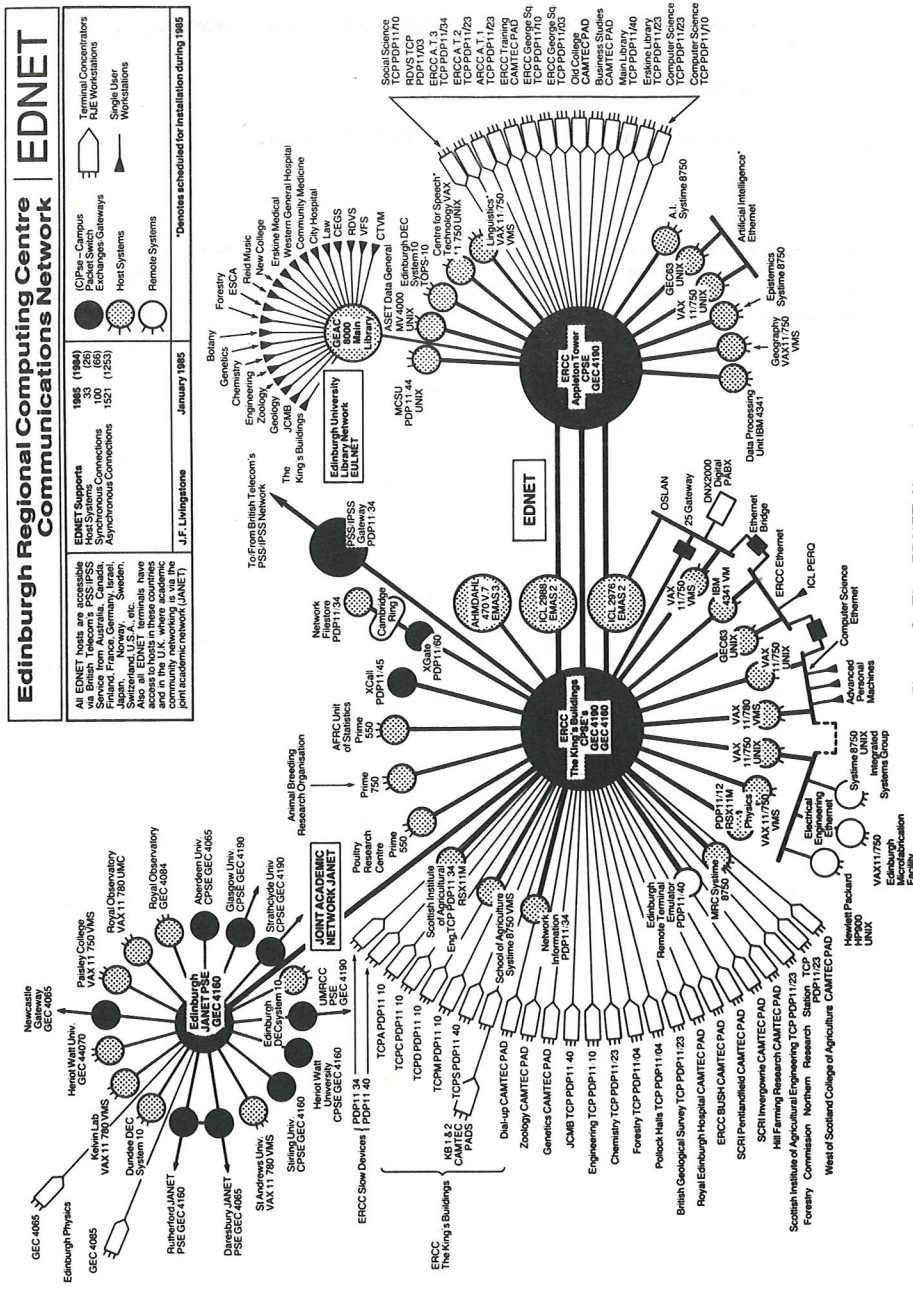


Figure 6: The EDNET Network.

8. CONCLUSION

The ERCC has more than fulfilled the brief given to it in the Flowers report. In 19 years it has:

- grown from 2,623 registed users to 7,878,
- its annual turnover has grown from £109,072 to £4,543,672,
- its staff has increased from 70 to 185.

Throughout its short history it has made a substantial contribution to academic computing and computing in general. The establishment of an interactive computing service and a large network has been a remarkable achievement, but by far the most important result of this has been that of making computers accessible to all potential users in the Edinburgh university community.

9. SUMMARY

The ERCC was set up in 1966 after recommendations in a Government sponsored report into university computing. The report recommended that:

(a) Edinburgh should have a university computing centre;

(b) A joint university/manufacturing company project should be set up to produce an interactive computing operating system;

(c) Edinburgh university computing centre should serve the computing needs of the academics in the Edinburgh community and also provide facilities for research council establishments;

(d) The computing centre should liaise with other local universities in providing a regional service to Scottish university and research council users;

(e) Because of its regional nature the Edinburgh computing centre should be known as the Edinburgh Regional Computing Centre (ERCC).

From 1966 to 1970, the ERCC offered computing on IBM batch machines and developed the Edinburgh Multi-Access Project (EMAP) in conjunction with International Computers Limited (ICL).

From the early to the mid seventies, development by EMAP matured into a reliable service operating system called the Edinburgh Multi-Access System (EMAS) which was mounted on a Dual ICL 4/75 system. This was regarded as a great achievement and from the first service in 1971 until this day, the EMAS system has been the main service vehicle for the ERCC.

During the development years of EMAS, the ERCC continued to provide and expand its services on local and remote IBM hardware and software. Because these machines offered large amounts of computer storage, the Social Science and other groups were encouraged to use them. These users have continued to use the Centre's services, they have not attempted to provide their own as has happened in other universities.

In 1977, the ERCC received one of the first ICL 2900 computers which was supposed to provide a combined batch and interactive service for the Edinburgh users. Unfortunately the machine did not live up to its expectations and the EMAS project team quickly developed an operating system called EMAS 2900. This system was mounted on the ICL 2980 machine in 1979 and also on the Dual ICL 2972 machine (dual 4/75 replacement) in the same year. It managed to handle the batch and interactive load that the ICL software could not and EMAS 2900 became the mainframe operating system for the ERCC. A new EMAS is planned for a new Amdahl computer and it looks like it will continue into the 1990s. Whether it will continue after that will be decided by other external factors such as personnel, management and competition from other operating systems.

Since its birth, an extensive computer network has grown around the ERCC. In the early 1970s, a regional network was set up which encouraged communication links with other universities and led to the development of the Regional Computing Oganisation Network (RCOnet). During the same period, a local Edinburgh network grew up to support users who wanted to use the interactive EMAS service.

In 1979 the management of these two groups merged and started improving the local network and its links with other networks. The local network was called EDNET, and through it, local users could access hosts on a national network called the Scientific Research Council Network (SRCnet). In 1982, SRCnet was expanded to include other university networks and was renamed the Joint Academic Network (JANET).

The ERCC has carried out the brief given to it in the Flowers report and has been instrumental in encouraging university departments and research council establishments to become involved in computing.

10. GLOSSARY OF TERMS & ABBREVIATIONS

Interactive Computing	Direct conversation between a user and the computer they are using.
Batch Processing	Computer jobs are grouped together, stored in the computer and run one after the other.
Computer Network	A collection of large and small computers, data communication equipment and computer terminals which allow a number of users to access a number of mainframe computers.
Micro-computer	A small computer consisting of a keyboard, a Visual Display Unit, a computer memory and a small floppy disc drive. It can be used only by one person at a time for program development, computer graphics, word processing and many other applications.
VAX/VMS	An operating system run on the Digital Electronic Corporation (DEC) company's VAX computer.
UNIX	An increasingly popular operating system developed by the American Bell Laboratories of the A.T.& T. LABS. company.
Remote Job Entry (RJE)	Sending in computer jobs to a computer from a card reader which is located at some distance from the main computer.
Front End Processor (FEP)	A mini computer which connects a mainframe to a computer network.
Terminal Control Processor (TCP)	A mini computer used to connect a group of interactive terminals to a computer network.
Workstation	A mini computer used to send computer jobs to and receive jobs from a mainframe computer.
Multi-Access System	An operating system which allows several users to communicate concurrently with a computer through terminals.
Node	A mini computer which acts as a switch within a network.
Software	The programs that act as the brains of the computer.
Hardware	The physical part of the computer, i.e. the metal boxes with the wires and circuits inside.

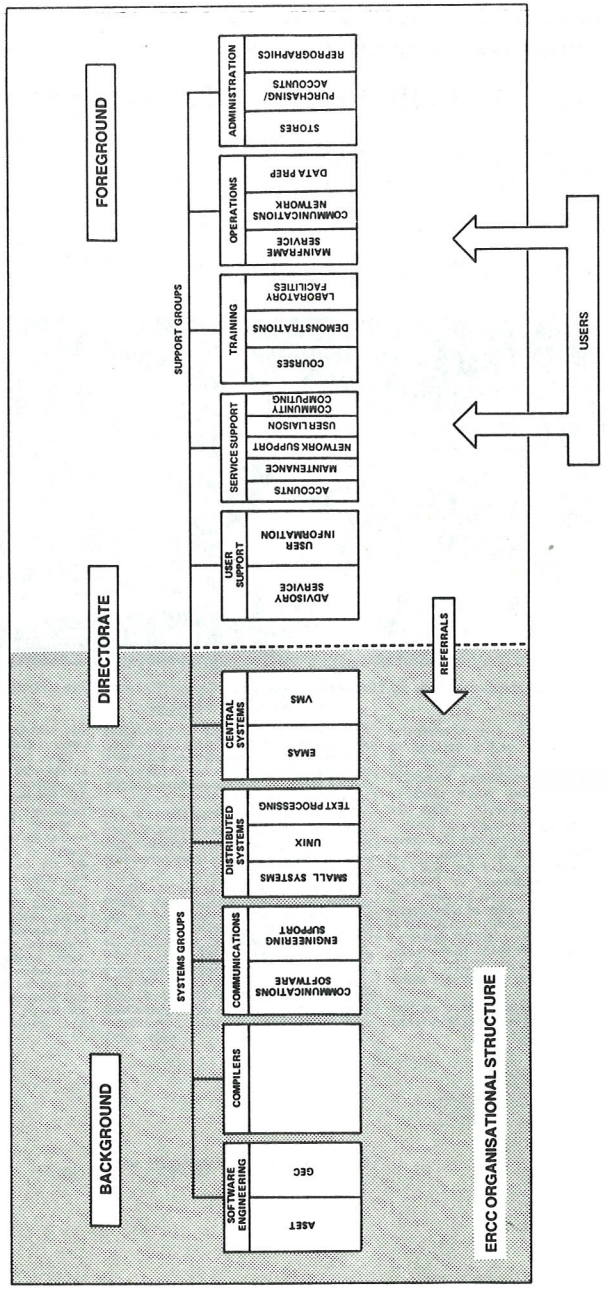
Compiler

A computer program which converts a user program (written in a high level computer language) into the internal instructions of a particular computer.

Host

A mainframe computer on a computer network. If you are registered as a user of this Host, you will be able to use it along with a number of other users.

I. The Organisation of the ERCC



II. ERCC Press Cuttings and Photographs

COMPUTER PROJECTS: *DETAILS OF UNIVERSITY PLAN REVEALED*

I.C.I. man to head Edinburgh Scheme'

Details were disclosed yesterday by Edinburgh University of how the first of the three regional computer centres recommended by the Flowers Committee is to operate. The four main points of the Edinburgh scheme are the appointment of a director with more than 10 years' experience as a major industrial computer user, the acceptance of an English Electric Leo Marconi System 4 model 75 machine, establishment of the Edinburgh centre as a comprehensive service department, and a decision to embark on a large-scale research and development for producing computer programmes enabling many users to simultaneously "converse" with the central computer over telephone lines.

Directorship of the centre has been offered to Dr. Gordon E. Thomas, who is head of the computer group for I.C.I. He takes up his appointment in October. Equipment for the Scottish location will be housed in the first section of Edinburgh's £2,250,000 Mathematics-Physics Institute at Kings Buildings. The £750,000 System 4 will not be ready until 1968. In the meantime an English Electric KDF9 will be rented from November to deal with immediate work.

Decisions have not been taken on how the two other regional centres at Manchester and London will operate, although it seems likely that an existing department at each of the locations may be used as the basis for obtaining experienced staff needed to man such establishments.

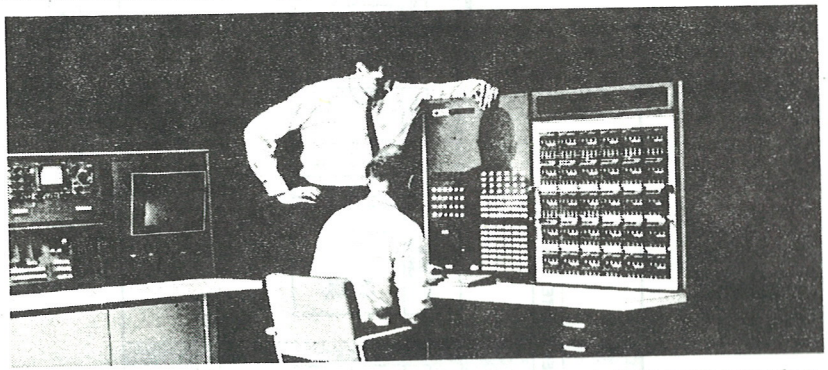
Some of the difficulties of running very big computer installations in a research centre have been outlined by the international nuclear physics organization C.E.R.N., which has installed one of the world's largest machines, a Control Data Corporation 6600. A report by the organization makes it clear that programming development work on such large scale equipment presents considerable difficulties, and that advanced research projects are making demands that are pushing computing technology to its limits.

C.E.R.N. says that research work has been badly affected by computing difficulties and that some scientists will have to live with this problem in one form or another from now on.

A scientific policy committee has recommended that the organization needs a computing service that guarantees better user reliability for the scientists, and that a large secondary machine is essential to meeting these requirements. A Control Data 3800 is being installed as a secondary system and a decision is to be taken by September whether or not to accept a bigger system, a CDC 6400, for this purpose next year. In an effort to maintain a round-the-clock service, even though the large machines need daily maintenance, C.E.R.N. is considering linking the 6600 and 6400 together in a time-sharing complex.

The University of Sussex is to extend its post-graduate and research activities in electrical and electronic engineering with the installation of a medium scale hybrid computing system and Electronic Associate's 680. The machine costs £38,000 and the university intends to use it for developing new techniques of simulation for research into unconventional machines such as linear induction motors.

More than 4,000 computer experts from all over the world are expected to attend the congress of the International Federation for Information Processing planned for Edinburgh in 1968, for which the Queen is patron. More than 250 papers will be read at the meeting covering major developments in research and development, and the use of new programming techniques and computing machinery. I.F.I.P. maintains several technical committees examining and making recommendations for better standards in the field of computers and information processing. One of these is engaged on the monumental task of preparing several monolingual dictionaries of information processing terms. Each volume will contain definitions of some 1,500 terms and concepts that have been accepted in the jargon of the computer world as *de facto* standards.



The 680 hybrid computer made by Electronic Associates. Sussex University are to install one for post-graduate education and research.

The Times 1966

EDINBURGH'S COMPUTER DIRECTOR NAMED

As Edinburgh University named the first director of the Edinburgh Regional Computing Centre yesterday, the city moved nearer to a leading role in the development of "conversational" computer systems.

Conversational systems gave answers within seconds, against conventional computers' one or two a day, explained Dr Gordon Eric Thomas (38), who becomes director of the centre in October.

The Americans had developed conversational systems, but the Edinburgh Centre would pioneer with British computers, making such systems available in Britain, Dr Thomas told "The Scotsman."

The Edinburgh Centre, which has been set up following the recommendations of the Flowers Committee, will establish initially an advanced computing network for the university and the Research Council in the Edinburgh area. The centre begins research work next year.

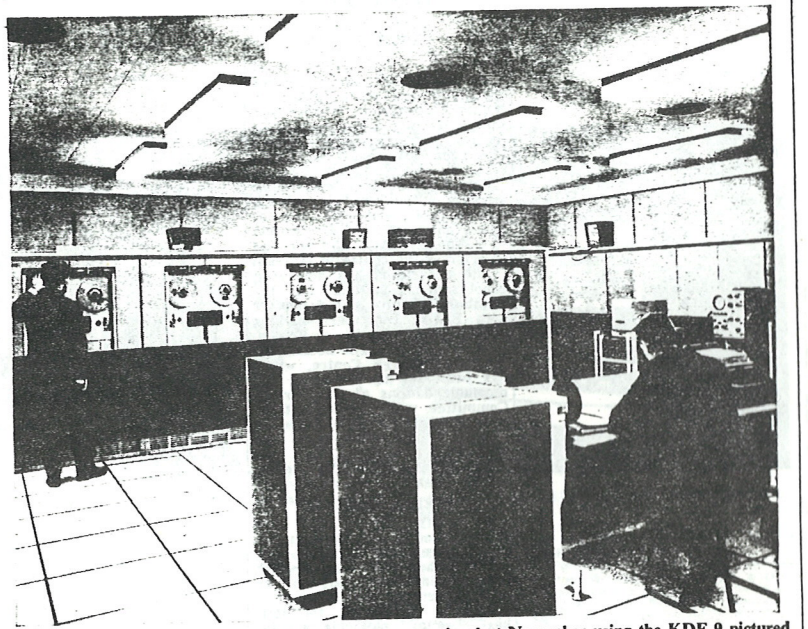
INTERIM MEASURE

University users and local research bodies will have immediate service from a KDF9 computer to be hired from English Electric in November, as an interim measure.

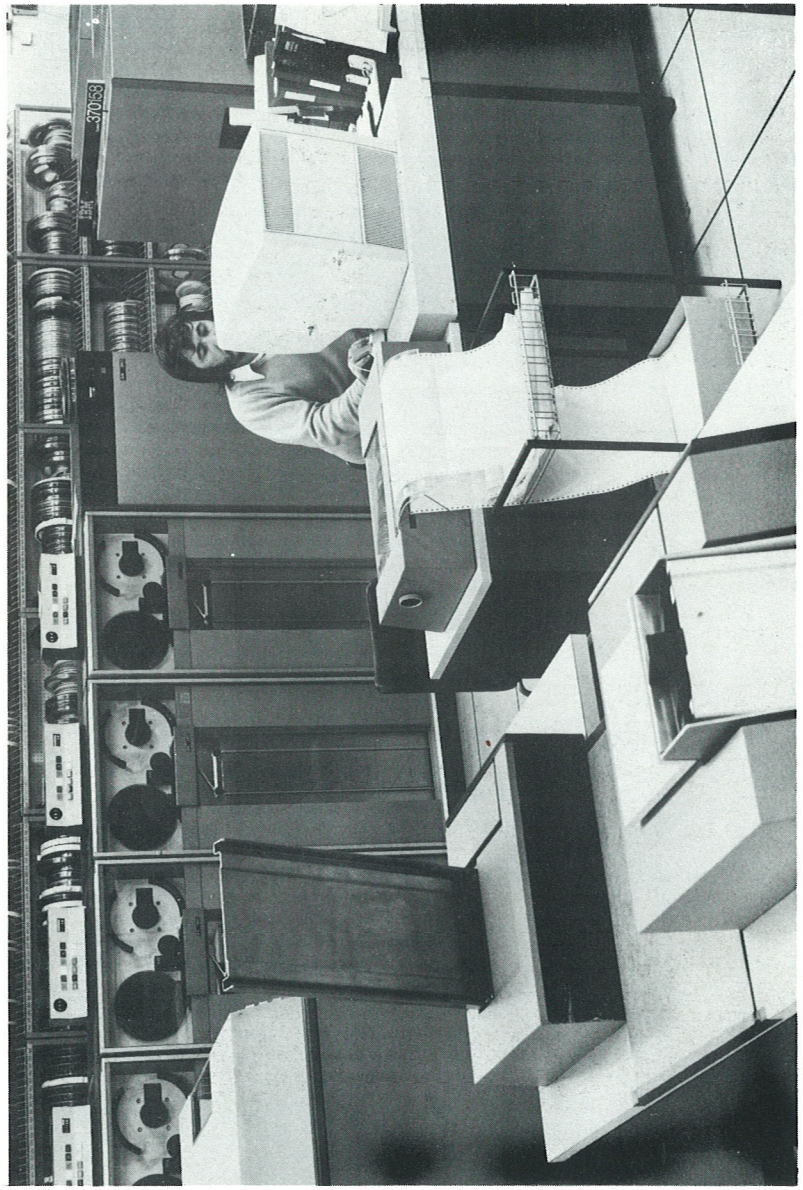
Already the search for staff has begun, particularly for experienced master programmers and engineers with telecommunications and computer knowledge, said Dr Thomas.

Dr Thomas, who graduated with first-class honours in physics at Manchester in 1948, was engaged in research on the first digital computer in Britain and, in 1955, joined I.C.I. after lecturing at Manchester University. He is at present head of the computer group in the management services section of I.C.I. at Wilton, Teesside.

The Scotsman February 1967

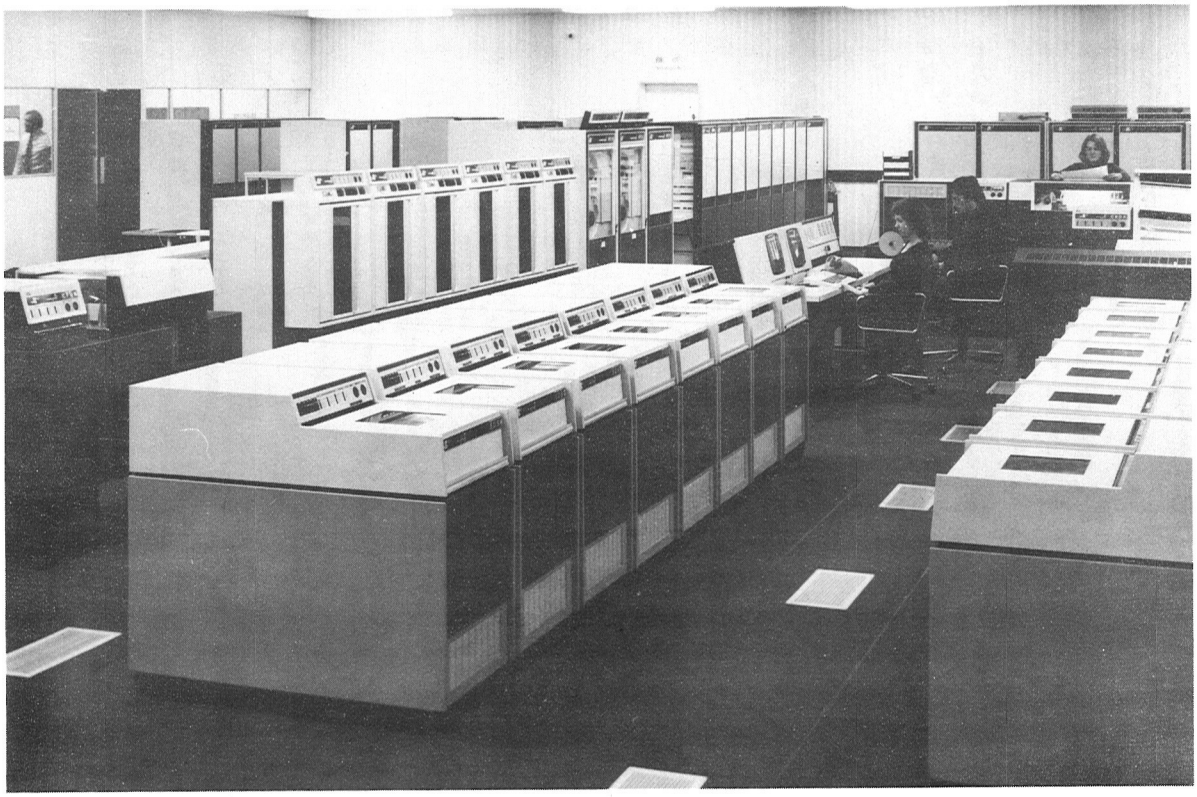


Edinburgh Regional Computing Centre went into operation last November using the KDF 9 pictured here. This machine is being rented by the centre as an interim measure until the EELM System 4-75 multi-access configuration is delivered in 1968. The KDF 9 has been operating for 14 hours a day since the beginning of the year offering a service to Edinburgh University and to research workers at local research institutes and units, in particular those under the Agricultural Research Council.



The IBM 370/158 Computer

The Dual ICL 4/75 Computer System



The ICL 2980 Computer

III. Senior Members of Staff in post on August 68

Director	G.E.Thomas, B.Sc.,M.Sc.,Ph.D.,M.I.E.E.
Operations Manager	Mrs M.M.Barritt
Applications Manager	R.E.Day, B.Sc.
Administrative Officer	D.B.Marshall, T.D., M.A., B.Com.
Senior System Analyst	J.G.Burns, B.Sc., Ph.D. P.E.Williams, B.Sc.
System Analyst	W.Aitken, B.Sc. F.E.J.Barratt J.Ellenby, B.Sc. G.E.Millard, B.Sc., A.R.C.S. C.H.Nicholas, B.Sc. P.D.Stephens, B.A.
Head Applications Programmer	D.T. Muxworthy, M.A.
Senior Applications Programmer	H.M. Moores, B.Sc. D.D.M.Ogilvie, B.Sc.
Senior Systems Programmer	Miss C.R. Marr, B.Sc. H.E.Woodman, B.Sc. J.K.Yarwood, M.A., M.Sc.
Programmer	Mrs L.D.Aitken, B.Sc. M.J.Avis, B.Sc. M.D.Brown Miss A.Finch, B.A. Miss M.M.Fisher, M.A. Mrs H.A.Hughes, B.Sc. E.R.Mansion, B.Sc. R.L.Middleton, B.Sc. Mrs J.E. Munro, B.Com. J.Wexler, B.A.
Program Librarian	D.N.Allum, B.A.
Executive Officer	J.Robertson
System Engineer	W.Watson, B.Sc., M.Sc.
Engineer	J.G.Fordyce A.B.Henderson
Data Preparation Controller	W.M.Gordon
Operations Controller	C.C.Davies D.O.Sturgess R.C.West

IV. Milestones in the History of the ERCC

DATE	MAIN STREAM	BACK-UP
Jan 66	Designated as Regional Centre in Flowers Report, to concentrate on provision of multi-access services	
Autumn 66	EMAP started	
Jan 67		KDF 9 service begun
July 68		RJE link to NUMAC
end 68	4-75 delivered OS software very poor	
April 69		KDF 9 replaced by 360/50
	RCOnet set up.	
Sept 70	EMAP ended EMAS development started Communications node project started.	
Oct 71	EMAS service begun	
Aug 72		360/50 replaced by 370/155
July 73	2980 ordered (for batch and MAC)	
Jan 74	ICL project team for 2980 complete	
March 74	Second 4-75 in service	
April 74		370/155 replaced by 370/158
May 74	4-75 FEP in service	
March 75	New filestore proposed	
July 75	2980 delayed - development 2970 installed	
Sept 75		370/158 discontinued, service transferred to NUMAC

DATE	MAIN STREAM	BACK-UP
July 76	2980 delivered	
July 76	EMAS development on 2970 started	
June 77	2980 failed benchmark deadline	
June 77	New filestore agreed	
Jan 78	2970 transferred to Edinburgh (local)	
April 78	Pilot EMAS service on 2970	
June 78	New filestore in service	
Sept 78	High speed network project started	
Oct 78	Full user service on 2970	
Jan 79	User service on 2980	
June 79	Dual 2972 replacement for Dual 4/75 Local and regional communications amalgamated	
Jan 82	JANET formed	
Jan 85	Amdahl 470/V7 machine accepted as eventual replacement for ICL 2988 machine.	