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UNIVERSITY OF EDINBURGH

EDINBURGH REGIONAL COMPUTING CENTRE

Fourteenth Annual Report

ERCC

EDINBURGH REGIONAL COMPUTING CENTRE

Fourteenth Annual Report

1 August 1980 to 31 July 1981

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Membership of Edinburgh Computing Committee

Nominees of the Educational Policy Committee	Professor M. Anderson (Convener), MA,PhD Mrs M.M. Barritt, FBCS Dr J.C.P. Schwarz, MA,BSc,PhD
The Director, Edinburgh Regional Computing Centre	Dr G.E. Thomas, BSc,MSc,PhD,MIEE,FBCS,FRSE
The Deputy Directors, Edinburgh Regional Computing Centre	Dr J.G. Burns, BSc,PhD Mr P.E. Williams, BSc
Representatives of the Research Councils	Dr D.P. Blight, BSc,MSc,PhD,CEng,FIMechE Mr S.M. Lawrie
Representatives of the Users' Committee	Mr T.W. Jones, MA Miss J. Muscott, BA Dr D.J. Rees, BSc,ARCS,PhD
Representatives of the Faculty of Science	Dr M.A.D. Fluendy, MA,DPhil,CChem,FRCS,MInstP,FRSE Professor P.G. Jarvis, MA,PhD,FilDoc,FRSE
Representative of the Faculty of Medicine	Professor D.C. Flenley, BSc,MB,ChB,PhD,FRCPE,FRCP
Representative of the Faculty of Social Sciences	Professor T.A. Lee, MSc,CA
The Professor of Computer Science	Professor S. Michaelson, BSc,ARCS,FRSE,FIMA,FRSA
Secretary	Mr A.F. Woodburn, BSc,DPA

Regional Computing Organisation
Membership of the Management Committee

University of Edinburgh	Professor S. Michaelson, BSc,ARCS,FRSE,FIMA,FRSA
	Dr G.E. Thomas, BSc,MSc,PhD,MIEE,FBCS,FRSE
	Mr P.E. Williams, BSc
University of Glasgow	Mr J.M. Black, (Convener), BA
	Dr G.K.S. Browning, BSc,PhD
	Professor A.M. Potter, MA,PhD
University of Strathclyde	Professor D.S. Butler, MA,FIMA
	Mr J.G. Fraser
	Dr D.E. Kidd, BSc,PhD
Research Councils	Dr D.P. Blight, BSc,MSc,PhD,CEng,FIMechE
Computer Board Assessor	Professor R.E. Burge, BSc,PhD,FIP
Secretary	Mr A.F. Woodburn, BSc,DPA

Senior Staff of the Edinburgh Regional Computing Centre
(as as 31 July 1981)

Director	G.E. Thomas, BSc,MSc,PhD,MIEE,FRSE
Deputy Directors	J.G. Burns, BSc,PhD
	P.E. Williams, BSc
Administrative Officer	D.B. Marshall, TD,MA,BCom,MBCS,AMBIM
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	F.E.J. Barratt, MBCS
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	W.D. Hay, BSc,DPhil
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Senior Computing Officers	M.D. Brown, MBCS
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	C.D. McArthur, BSc
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	R.L. Middleton, BSc
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	B.R.P. Murdoch, BSc

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	D.J.W. Stone, BSc,MSc
	D.O. Sturgess
	B.A. Tate, BA,PhD
	J. Wexler, BA
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	M.J. Cross, BSc,PhD
	K.W. Currie, BSc
	J.G. Fordyce
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	A.G. Kettler, BSc
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	C. McCallum, BSc,PhD
	A.L. McIntosh, BSc
	J. McKie, BSc
	D.B. Mercer, BSc
	L. Morris
	A. Nisbet, MA
	R.J. Pooley, BSc,MSc
	C.R. Rees, BSc
	A. Shaw, BSc,MSc
	R. Soutar, BSc
	H. Talbot, BSc
	W. Watson, BSc,MSc
	S. Wexler, BSc
Assistant Computing Officers	M.W. Brown, BSc
	C. Holden, BSc
	D. McKelvie, BSc,MSc
	I.H. Richmond, BSc
	N. Stroud, BSc,DPhil
	J. Payne, BSc
Executive Officer	J. Robertson
Reprographics Manager	D.J.L. Stewart-Robinson

Thirteenth Annual Report

Introduction

The Regional Computing Organisation operated for the first year under its new constitution. As under the old constitution, each constituent University appointed three representatives to the Management Committee and the Research Councils one representative. The Computer Board ceased to be formally represented on the Committee although a member of the Computer Board is invited to attend as an assessor. The Regional Director is no longer a member of the Committee *ex officio* as the post has ceased to exist. The Convenership passed by rotation to the University of Glasgow as Mr J.M. Black succeeded Professor D.S. Butler.

The Convenership of the Edinburgh Computing Committee also changed with Professor M. Anderson replacing Professor C.B. Wilson. The Committee was saddened by the death of Mr A.F. Purser, a member representing the Computer Users' Committee, who had been active for many years as the link between the University computing community and the Research Council users of ERCC.

The change in the Regional Computing Organisation constitution has led to a revision in the constitution of ERCC. As financial control of the Region has passed to the University of Edinburgh, the Regional Management Committee is no longer involved in the appointment of staff in ERCC and the constitution has been amended to take account of this.

From the outset ERCC has provided a computing service to Research Council institutes as well as to University users. The year saw an acceleration in the decline in Research Council use of ERCC, a process which has been underway for a number of years. Other Treasury funded users, particularly the institutes funded by the Department of Agriculture and Fisheries for Scotland have grown in importance. This is likely to lead to a change in the constitution of the ERCC and of the Edinburgh Computing Committee. The weakening in the constitutional link with the Research Councils means that income from the sale of computer services is less secure than before.

The dual 2972 computer has performed well in its first year of service with no particular teething problems. The dual processor configuration allows the service to users to be maintained where a breakdown is confined to a single processor and this greatly improves the continuity of service. The 2980 has given much better service under the EMAS operating system although hardware reliability continued to be a problem. The improved service has succeeded in attracting users at last and usage ran close to the maximum available computing power in the latter part of session 1980-81.

Distributed computing continued to be a major growth area. A particularly notable development has been the decision of the Edinburgh Computing Committee to devote part of its UGC equipment allocation to a new PDP 11/44 computer in the Medical Computing and Statistics Unit. This will provide a service to users of the UNIX operating system in the University at large as well as to users in the Faculty of Medicine. ERCC began a study of office systems with the aim of providing support for administrative computing in the University.

In common with the rest of the University, ERCC faced considerable financial difficulties. Economies in staff and materials have been made and this has inevitably led to reductions in service in some areas. ERCC hopes to alleviate the worst effects of economies by improving income generation.

Regulations for users of ERCC were approved by the University Court to come into effect in session 1981-82. The regulations provide a measure of protection for computer systems and data. It is intended to extend this protection by developing codes of practice to govern the use of sensitive data.

EMAS Services

2980

The changeover in the operating system of the 2980 from VME/B to EMAS was described in last year's Report. Under the new operating system, the machine was heavily used throughout 1980-81. Utilisation of the 2980 by participating institutions is shown in Appendix A(i). The largest share went to users in in Edinburgh University, partly at least as a result of the load put on the 2980 while the dual 2972 was being installed. Use by the University of Glasgow has been inhibited by a communications problem at the Glasgow end which has now been solved and this helps to explain Glasgow's low utilisation compared to Edinburgh and Strathclyde.

The machine was extended during the year by the addition of 512 Kbytes of store (bringing the total to 3 Mbytes), two controllers and two 200 Mbyte disc drives. This has resulted in, among other things, improved processor utilisation at peak interactive loads, and hence an improved interactive response. The peak interactive load has been limited to a maximum of 80 simultaneous users in order to be able to provide some parallel capacity for batch work.

The main problem with the service was its poor reliability, mostly as a result of hardware faults. The average mean time between hardware failures during 1980 was about 45 hours – a tolerable but hardly outstanding performance – but fell sharply at the end of 1980. The lowest point was reached during the spring of 1981, after a very extensive modification exercise. Performance has since improved gradually, but did not reach consistently the 1980 level in the period of this report. A lot of effort is being put into trying to achieve higher reliability, both by Centre staff and the ICL maintenance team. It must be hoped that this effort will soon bear fruit.

2972s

At the start of the review period there was no EMAS service based at King's Buildings. An interim service to former 4-75 and 2970 users was being offered on the ICL 2980 computer at Bush Estate running under EMAS. Despite the rather heavy user load, especially during September 1980, and the rather tight file index limits this transitional service was very successful and was a major factor in providing a smooth progression to EMAS for those users.

Meanwhile the renovation of the former 4-75 machine room progressed close to schedule and was ready to receive the new computer by mid-August 1980. ICL commissioned the new dual 2972 configuration on schedule but the acceptance trials were delayed one week as a result of air conditioning problems. The 2972 system passed its five day acceptance trials, which included a demonstration of its ability to run under the EMAS operating system, virtually without a hitch and was formally accepted on Friday, 19th September.

The EMAS software itself was enhanced over the summer vacation to control a dual processor configuration, with only minimal access to suitable hardware. It was a major achievement of the EMAS Project team that the demonstration section of the acceptance trials was run with EMAS operating in dual processor mode. No serious problems were encountered with the new software and user service was based on the full dual configuration from day one.

The interim service on the 2980 closed on Tuesday, 23rd September and the on-line and archive files of those users allocated to the 2972 service were transferred from the 2980 the following day. Only two days user service was lost as a result of this transfer and service was officially opened ahead of schedule on Friday, 26th September in good time for the start of the autumn term. This culminated what both users and the Computing Service agreed was a very smooth transition which was virtually transparent to most users.

The first year of service has clearly shown the wisdom of choosing a dual processor configuration to replace the 4-75s. The dual processor configuration was available for 95% of the scheduled service hours but the uptime has remained close to 100% (the average weekly system uptime was 99.7% over the year). This means that despite the fact that the two 2972 processors did have a significant number of faults a user service was virtually always available when scheduled. The mainframe hardware showed good mean-time-between-failures figures throughout the year with several extended periods of between 100 and 500 hours MTBF. Also the increasingly reliable communications network contributed to improved overall reliability in accessing the user service as compared with previous years.

User response to the successful service of the first year has been to request even more of it; in particular, continuous service over the lunchtime system maintenance slot and an EMAS service at weekends were the most popular

improvements in services/facilities requested by users. System support efforts have thus concentrated initially in improving the overall resilience of the service and more recently in modifying the operating system to simplify continuous operation. The deficiencies in complete resilience in the initial 2972 configuration are gradually being repaired by a policy of purchasing selected equipment as it becomes available second-hand at considerable savings compared with new prices. By the end of this review period we are able to partition the hardware allowing a user service on one "half" of the system to proceed in parallel with either hardware maintenance or system development on the other "half". Considerable software effort has gone in to allowing major units, such as a 2972 processor or a user disc pack, to be added to or removed from a running service thus eliminating the system reload which was previously necessary when partitioning the system. Although there are still improvements to be made users can already look forward to increased service availability in the coming academic year.

Communications

It has been another very active year in communications. Last year's report mentioned a number of projects which were in progress and others in prospect. The first of these was the provision of a network enquiry facility, which would provide users and the Centre with a continually updated account of the state of each host, node and terminal concentrator in the network, together with an indication of the load on each component. This went into service in October 1980 and has proved to be extremely useful. It is used to provide "ALERT" information, replacing the ansaphone service. Another project was the provision of a gateway between the network and British Telecom's national packet switched service (and also to the local branch of the SERC network). This went into experimental service in the spring of 1981 and is due to go into full service on 1 October. The third project mentioned in last year's report was the Cambridge Ring, a pilot version of which was then under construction. This went into service early in 1981 as planned and now links one of the front end processors of the 2972s, a node and three terminal concentrators. There are currently 150 terminals connected to the network through the ring. The pilot ring has proved highly successful and the expansion of it, and the possible introduction of a new ring in the central area of the University, is now being considered. The fully engineered version of the ring design produced by the Centre is now being marketed by SEEL, a vigorous and rapidly expanding local company.

Plans for the changeover of the communications network to X25 protocol standards have been developed, and in conjunction with our colleagues in Glasgow and Strathclyde a joint proposal was put to the Joint Network Team

of the Computer Board. As a result a small "standard" X25 switch is to be provided for installation at Edinburgh so that work on the modification of terminal concentrators and front end processors to match X25 standards can proceed. This switch is expected to arrive early in 1982.

Other work has been mainly concerned with extending and maintaining the increasingly extensive network, a diagram of which appears in Appendix C. One requirement has been the need to replace the original nodes based on Modular One computers, some of which were nearly ten years old, and work was put in hand with the aim of replacing them during the summer of 1981. Although most of the software used in the Modular Ones can be transferred to the new node (a PDP 11/45) the operation has involved the programming of a new communications controller based upon multiple Z80 microprocessors and this has proved a much more difficult task than was originally expected.

Future tasks include improving the resilience of the network to component failures. Reliability of each component is reasonably satisfactory but there are still many instances where a single failure can shut off a number of users from all other parts of the network. Another requirement is to reduce the cost of connection to the network, which is now typically at least as high as the cost of the device being attached. Much thought has been given in Edinburgh, as elsewhere, towards the provision of a really low cost interface but there is not at present any obvious solution, particularly since new terminal devices tend to place much heavier demands upon the network than earlier generations.

User Services

The Advisory Service's experimental service at Bush Estate was well received by users there and is likely to become a permanent feature, staffing levels permitting. In particular, there has been much interest in the statistical package GENSTAT, for which new introductory documentation and courses have been prepared by the resident advisor. The Advisory Service has benefitted, especially at JCMB, by increased interchange with other ERCC staff. Two vacancies have been filled by staff from the Communications Systems Group, and a third systems programmer has spent a period of secondment with advisors, thus improving the flow of information between users and the EMAS Systems Team.

The Training Unit has welcomed the arrival of a new Assistant Training Officer with experience of video tape based courses. The arrival in the near future of the appropriate equipment will enable the Unit to produce, in collaboration with Audio Visual Services, its own courses on this medium. In time, this will result in an extended repertoire of courses and these tapes, together with their supporting documentation, will be available to users, both for classes and for individuals, at times which best suit them.

Throughout the year the Data Base Systems Unit has again been providing support to a range of user application projects involving data bases. Recently completed projects include the Unit's first major application on a microcomputer – an information retrieval system for the Department of Human Genetics, and a Donor Records System for the Blood Transfusion Service to which a senior member of staff has now been seconded for three years. Maintenance and enhancement of FISS (the Fortran Interface to IDMS) has continued for ICL's 2900 Series computers. During the year, the specification was fixed in consultation with a working party of users, for a new data base system to be brought into service in 1982. This system, named ENUF (Edinburgh User-Friendly System), will run on a range of systems, initially including EMAS and UCSD p-System, and will provide users with data management, retrieval and manipulation facilities in a much friendlier way than is the case with IDMS and other systems oriented more to the needs of computer system professionals.

Distributed/Dispersed Computing

In 1978 it was our analysis that the coming five years would see a substantial change in the pattern of computing and it is appropriate to review progress at the half way point. In short we predicted that a substantial central resource would continue to be required, and this has been secured with the 2900s, that there would be a requirement for specialised resources to serve the growing distributed community and that the dispersed resources would begin to integrate.

We defined a distributed resource as being one which was dependent to a substantial degree on a Network, either to access important services or to reach its customers, whilst a dispersed resource was one which functions in its own right and does not normally access services over a Network although occasional connection to desirable services may be required. In these terms the earliest distributed resource was, in fact, the central multi-access service which became totally Network dependent in 1976 and today the 30 Terminal Control Processors supporting some 650 terminals remain the major clients of the distributed Network. The most significant dispersed resource has been the UNIX community which was implemented on five substantial PDP-11 sites at the start of the year.

The University first gave major support to this form of growth in 1978 when it centrally funded 50% of a major VAX 11/780 installation in Computer Science and this year has seen the full integration of that machine into the distributed scene.

At about the same time the Microcomputer Support Unit was formed and has now expanded to a staff of four. The Unit provides support on several

fronts to a chosen range of equipment, giving advice and consultancy not only on choice of hardware but also on operating systems and software packages. Microcomputers, now some 150 in total, tended, at first, to be dispersed resources but the year has seen the provision of software by the Unit which enables them to connect easily and fluently to the Network so that we now observe a substantial move towards their becoming a distributed resource. As reported last year the UCSD p-System remains the preferred choice for single user systems although evaluation of UNIX for multi user use on the new generation of machines is being pursued. The Unit is also continually evaluating the very powerful personal machines which seem likely to become available within the next year or two.

The Unit is further collaborating with University administrative staff in a study of computer based office systems and the requirements they should meet. Available systems and their applicability are being examined. An important consideration is their communication capability in order that they may properly access the facilities on the Edinburgh Network.

Turning to the existing UNIX scene the Centre, in conjunction with the UNIX community, appointed a UNIX Support Officer in November 1980 charged with giving general support to the sites but also, specifically, with integrating the group with the Network. Funds were allocated to this purpose and by the end of the year most of the hardware had been delivered and Network connection was hoped for by Autumn 1981. During the year the UNIX Officer has been based with the CAAD Unit in the Department of Architecture.

A basic and growing difficulty with UNIX on existing machines (all PDP 11s) is the limited kernel address space (48 Kbytes) and to overcome this the Edinburgh Computing Committee has allocated substantial funds to upgrade the Medical Computer Group's machine to a PDP 11/44 which has a 4 Mbyte total address space and a kernel of 112 Kbytes which will allow full Network connection as a Host to be achieved.

Given that we can now foresee the integration of the UNIX community the major dispersed resource now becomes the 25 sites which run RT11 on a variety of DEC equipment. Software is available to allow Network connection in the same manner as the microcomputers and several sites are now using this.

The developments we have described above all enable the users to connect to the distributed scene as clients for its services which are provided by Hosts or servers. At the start of the year the only Hosts were the EMAS 2900 systems and the year has seen the addition of three Hosts – the Computer Science VAX noted above, the Network Information service described elsewhere and the Edinburgh Filestore. The Filestore has been constructed from ex-System 4 equipment and provides 2000 Mbytes of on-line storage. Provision is made for both interactive access and 'batch' access and the facilities provided allow comprehensive manipulation of files through directory structures. Thus a

microcomputer user may typically use the Filestore to hold his files or to access libraries of software provided by the Support Unit whilst, at the other extreme, the EMAS user may use it as a fast and secure additional level of storage. The Filestore was released to user service in April 1981 and usage is growing steadily. Magnetic tape equipment to provide archive storage was delivered later in the year.

In conclusion we can thus report a year in which steady progress has been made in providing a truly distributed set of facilities both through the attachment of client systems and the provision of Network servers, in particular the Filestore. It will be clear that this goal is totally dependent on appropriate Network facilities which are described in the Communications section.

DEC system 10

(SERC Interactive Computing Facility)

The intentions of the SERC's Interactive Computing Facilities Committee reviewed in the last Annual Report have been carried out during the year. The 1070 machine with a KI CPU has been replaced by a 1091S with a faster KL CPU. There has been also, a doubling of main memory to 512K words of MOS memory, a trebling of disc memory to 1000 Mbytes, and the installation of faster, dual-density magnetic tape drives. At the same time the communications sytem has been expanded and rationalised.

Part of the upgrade plan was a requirement to achieve economy in operating costs by installing the new machine in the main ERCC machine room where it could be serviced by the operators there, in parallel with the EMAS machines. The new equipment was installed and tested, in the main machine room, before the service on the old machine closed down, leaving only a 10 day gap whilst some equipment (mainly disc drives) was transferred from the old to the new location and the communications were re-arranged. The shutdown lasted from 16-27 October.

Since the opening of the new machine there has been a steady increase in the number of users and in machine usage. The machine is now running at about 80% of its planned capacity. The new machine permits a larger number of simultaneous users and this has risen from a maximum of about 23 to about 40.

The new machine has not been without its troubles but these have now been overcome. There were difficulties too with communications for some users while the communications nodes were adapted for the latest version of the TOPS-10 operating system which has now been installed.

A file archiving system FMS has been installed and will assist in delaying pressure on disc space - which for the first time in some years is not in short supply at present.

The file transfer system FTP was further extended to transfer files to all the SERC ICF Multi-users minis as well as the IBM machines at Rutherford Appleton Laboratory.

Arising out of the improvements and rationalisation made at the time of installing the new machine, the DEC-10 ANF-10 network has become much more reliable. In the wider field, the SERC gateway was converted from being a remote station to a front-end and is now very heavily used.

Consequent upon the closure of the UMIST DEC system-10, a new management committee under the chairmanship of Dr. G.E.Thomas has been set up for the Edinburgh machine. Since this is concerned with a single installation it is able to look at its affairs comprehensively and is not restricted to matters of common concern as was the earlier joint committee. The benefits of this are being felt. At the invitation of the SERC the Installation staff are now assisting in the formulation of policy for the development and support of single-user minicomputers.

External Services

Modest use was made throughout the year of the computing services at the Universities of Newcastle, Cambridge and Manchester. The one exception has been the heavy use of the ATMOL package by the Department of Chemistry, whose continuing search for substantial computing resources was constrained mainly by our allocation at Newcastle and Manchester. Following the announcement by NUMAC that their MVS service would cease later in 1981, there has been extra pressure on users either to complete their projects on that system or to transfer them elsewhere, in most cases back to EMAS in Edinburgh. Some use is expected to be made of MTS at Newcastle for access to packages available only on that system.

Communications with Newcastle, and with Cambridge via Newcastle, were satisfactory throughout the year, but communications with Manchester again caused difficulties for users. There is now the prospect of improved remote job entry access to UMRCC via Strathclyde University, but terminal access may not improve until PSS eventually provides a route.

Accommodation

The Microcomputer Teaching Laboratory, established in the first half of 1980 on Level 4 of Appleton Tower, was extensively used during its first year.

A flood, originating higher in the Tower around Easter-time led fortuitously to substantial re-furbishing of the Laboratory. Thus what had been an

unattractive environment for computing is now much better designed for study purposes. This, together with an upgrading of the equipment by the addition of visual display units to all 10 Apple II systems should lead to greater use of the Laboratory, particularly for teaching and for users' evaluation of equipment.

Staffing and Organisation

The new developments in the support of distributed systems led to the generation of several new posts within the ERCC establishment in the latter months of the 1979-80 review period. During the present year the financial constraints that applied throughout the University delayed the filling of certain of those posts and has meant that no further growth in the total establishment of the ERCC could be contemplated. Some adjustment of grades has however been possible and in particular a clerically related post in the training unit which became vacant was refilled at an academically related level.

When any post was vacated a rigorous examination of the need to refill it was conducted and by the end of the year 5 non-academically related posts had not been refilled. This has meant a significant loss of service in certain of the ERCC's services.

In the academically related complement there have been no resignations or retirals of staff but several staff have been assigned to income generating activities which satisfy the criteria agreed between the Unviersity and the UGC. This trend is expected to continue until a new financial equilibrium can be achieved within the substantially reduced level of UGC funds available to the University.

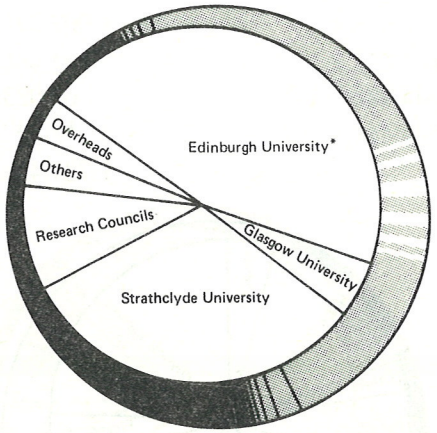
The structure of the organisation has remained stable through the year with very little movement of personnel.

Appendix A (i)

Utilisation of 2980 in 1980-81 by Participating Institutions

Institution	Computing Costs £	Proportion of Computing Costs %
Edinburgh University*	832,343.73	44.88
Glasgow University	90,039.66	5.23
Strathclyde University	591,298.67	31.88
Other Universities	4,623.61	0.25
Research Councils	177,050.60	9.55
Treasury Supported Users	67,023.11	3.61
Commercial Users	15,049.61	0.81
Overheads	70,373.62	3.79
TOTALS	1,854,802.61	100.00

*Including ERCC

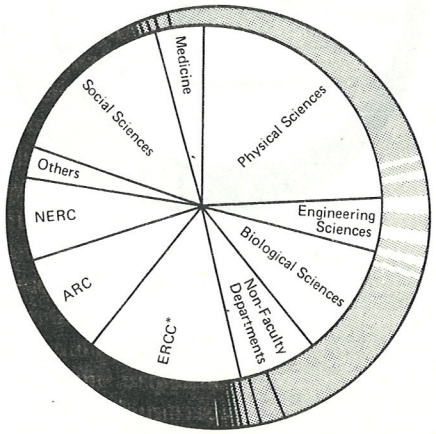


Appendix A (ii)

Utilisation of 2980 in 1980-81 by University of Edinburgh and Research Councils

Faculty or Sub-Faculty or Research Council	Notional Cost £	Proportion of Total Cost %
Arts	6,966.09	0.69
Divinity	291.66	0.03
Law	106.97	0.01
Social Sciences	156,714.22	15.52
Music	5.76	
Medicine	42,819.92	4.24
Dentistry	5,352.75	0.53
Veterinary Medicine	8,986.16	0.89
Physical Sciences	241,479.82	23.92
Engineering Sciences	51,046.43	5.06
Biological Sciences	102,426.52	10.15
Non-Faculty Departments	70,939.12	7.03
ERCC*	145,208.31	14.39
ARC	94,067.19	9.32
MRC	8,361.65	0.83
NERC	74,621.76	7.39
TOTALS	1,009,394.33	100.00
Other Universities	692,961.94	
Treasury Supported Users	67,023.11	
Commercial Users	15,049.61	
TOTALS	1,784,428.99	

*Less Overheads

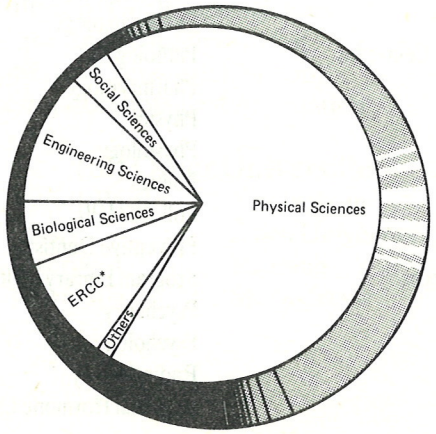


Appendix A (iii)

Utilisation of 2972s in 1980-81

Faculty or Sub-Faculty or Research Council	Notional Cost £	Proportion of Total Cost %
Arts	3,019.67	0.23
Divinity		
Law		
Social Sciences	47,810.95	3.67
Music		
Medicine	2,690.02	0.21
Dentistry		
Veterinary Medicine	86.54	0.01
Physical Sciences	879,444.30	67.58
Engineering Sciences	157,108.52	12.07
Biological Sciences	75,713.84	5.82
Non-Faculty Departments	8,754.14	0.67
ERCC*	124,744.83	9.59
ARC	1,565.05	0.12
MRC	433.51	0.03
NERC		
TOTALS	1,301,371.37	100.00
Other Universities	2,459.61	
Treasury Funded Users	5,173.60	
Commercial Users	7,383.28	
TOTALS	1,316,387.86	

*Less Overheads



Appendix B

List of User Departments (1980-81)

(i) University of Edinburgh

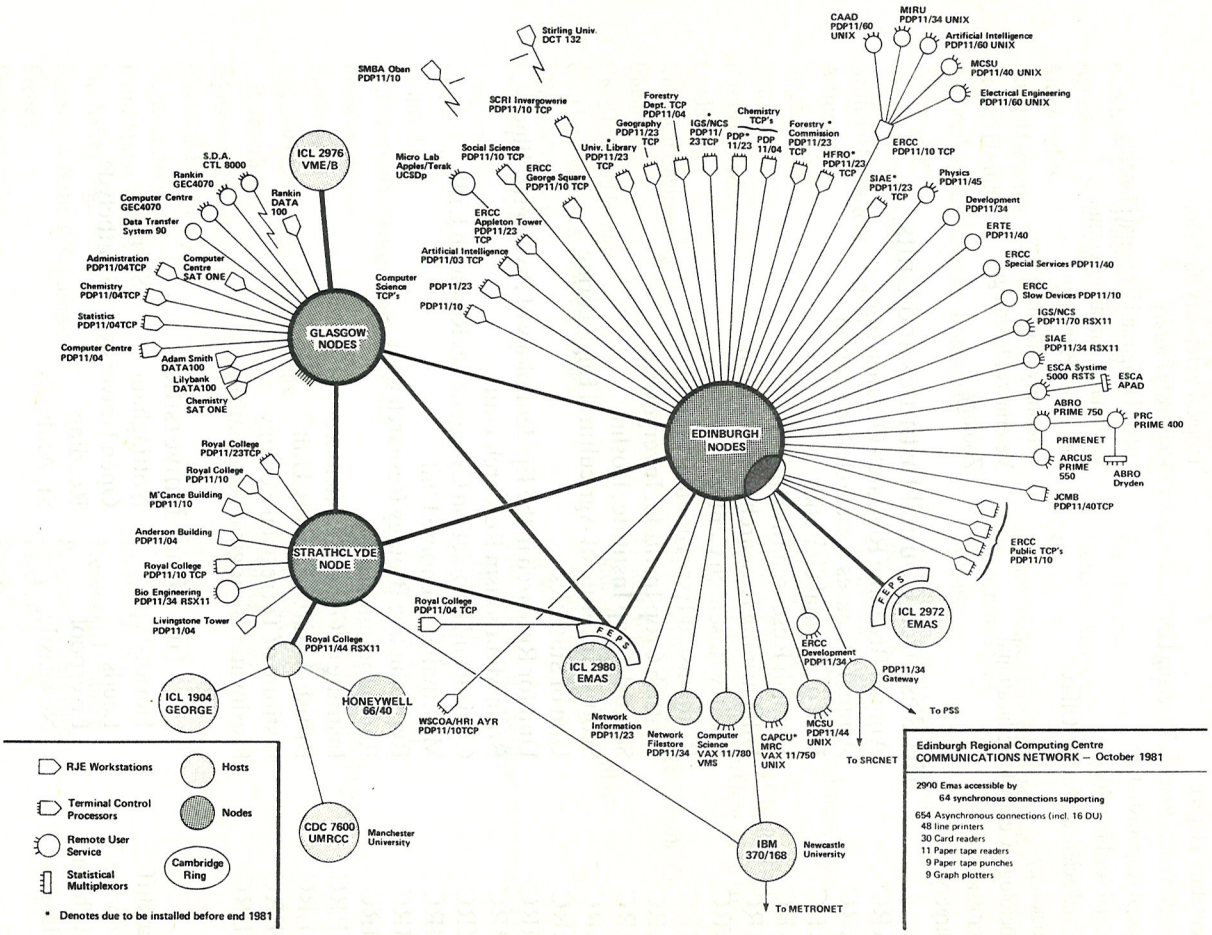
Accounting and Business Method
Agriculture, School of
Anaesthetics
Animal Genetics
Animal Health
Applied Language Studies, Institute for
Archaeology
Architecture Research Unit
Artificial Intelligence, School of
Astronomy
Biochemistry
Botany
Business Studies
Cardiology
Chemical Engineering
Chemistry
Child Life and Health
Civil Engineering & Building Science
Clinical Chemistry
Community Medicine
Computer Science
Conservative Dentistry
Criminal Law
Dictionary of the Older Scottish Tongue
Economic History
Economics
Educational Sciences, The Centre for Research in
Educational Studies
Electrical Engineering
English Literature
Extra-Mural Studies
Fire Safety Engineering
Forestry & Natural Resources
French
General Practice
Geography
Geology
Geophysics
Geriatric Medicine
Greek
History of Medicine & Science Unit
Human Genetics
Linguistics
Machine Intelligence Research Unit
Mathematics
Mechanical Engineering
Medical Computing & Statistics Unit
Medical Neurology
Medical Physics & Medical Engineering
Medical Physics (Western General Hospital)
Medicine
Medicine (Western General Hospital)
Meteorology
Middle English Dialect Atlas
Molecular Biology
Music
New Testament Language Literature and Theology
Nursing Studies
Obstetrics & Gynaecology
Opthalmology
Oral Medicine & Oral Pathology
Otolaryngology
Pathology
Pharmacology
Physics
Physiology
Politics
Pollock Halls
Preventive Dentistry
Program Library Unit
Psychiatry
Psychology
Radiotherapy
Regional Hormone Laboratory
Rehabilitation Studies Unit
Science, Faculty Office
Secretary's Office
Small Animal Practice Teaching Unit
Social Administration
Social Anthropology
Social Sciences, Faculty Office
Sociology
Sociology, Centre for Educational
Statistics
Surgery
Surgical Neurology
Tropical Animal Health
Tropical Veterinary Medicine
University Library
Urban Design and Regional Planning
Veterinary Computing Group
Veterinary Pathology
Veterinary Pharmacology
Veterinary Physiology
Zoology

(ii) Research Council Institutes and Units

ARC	Animal Breeding Research Organisation
ARC	Animal Diseases Research Association
ARC	Unit of Animal Genetics
ARC	Hannah Research Institute
ARC	Hill Farming Research Organisation
ARC	Poultry Research Centre
ARC	Rothamsted Experimental Station
ARC	Scottish Crop Institute, Invergowrie
ARC	Scottish Crop Institute, Roslin
ARC	Scottish Institute of Agricultural Engineering
ARC	Unit of Statistics
MRC	Unit for Research in the Epidemiology of Psychiatric Illness
MRC	Brain Metabolism Research Unit
MRC	Clinical and Population Cytogenetics Research Unit
MRC	Mammalian Genome Unit
MRC	Reproductive Biology Research Unit
MRC	Radioimmunoassay
NERC	Institute of Geological Sciences
NERC	British Antarctic Survey Unit
NERC	Institute of Terrestrial Ecology
NERC	Freshwater Biological Association

(iii) Other Universities

Cardiff
Dundee
Durham
Glasgow
Heriot-Watt
Leeds
Liverpool
Newcastle
Nottingham
Open University
Reading
St. Andrews
Stirling
Strathclyde



Appendix D

Final Accounts for 1980/81

Consolidated

Income	£	£	**Expenditure**	£	£
Computer Board direct grants			**Staff Costs**		
Recurrent grants	516,774.00		Academically related	1,006,890.74	
Earmarked capital: systems software	13,800.00		Other	482,500.86	
		530,574.00	Casual	106,840.52	
					1,596,232.12
Fully charged-out services			**Materials and services**		
Research Councils	228,895.23		Travel and subsistence	31,312.22	
Commercial	31,995.58		Computer materials	100,384.32	
Treasury supported	84,678.94		External service charges	382,638.05	
Edinburgh University	41,773.47		Mainframe maintenance	356,235.84	
Other universities	358.88		Telecommunciations	162,686.68	
Software contracts	157,150.66		Engineering development	39,551.77	
Staff contracts	6,731.83		Information and training*	48,568,76	
		551,584.59	General expenses	175,767.16	
				1,297,144.80	
SERC Contract			less: stocks-in-hand	13,408.48	
SERC payments	163,289.93				1,283,736.32
Sale of computer time	20,150.67				
		183,440.60	**Overheads**		
			Edinburgh University services to ERCC	190,323.75	
Recoveries		169,948.13	Edinburgh University services to SERC	18,183.25	
					208,507.00
Administrative services		149,355.70			
			Bad debts written off, less recovered		504.73
Edinburgh University contribution					
University award	1,060,666.00		**Balance due from SERC for 79/80**	5,767.00	
Ex CB/UGC grant	518,000.00		**add** adjustments ERCC	628.00	
		1,578,666.00	**less** adjustments Edin Univ	4,600.00	3,972.00 1,795.00
Balance b/fwd from 79/80		240,686,00	**Transfers to Capital Account**		70,000.00
			Transfer to PLU		19,500.00
Balance c/fwd to 81/82			**Balance c/fwd to 81/82**		270,570.31
SERC Contract underpayment		46,590.46			
		3,450,845.48			3,450,845.48

*Includes earmarked CB grant £13,800.00