COMPUTER LABORATORY

ANNUAL REPORT

1987/88

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Section 1 Introduction.

From the standpoint of the College computing service, 1987/88 will be remembered for the following events:

The signing of a contract for the replacement of the DECsystem-2060 by a new VAX system.

The delivery of a new turn-key library system to replace the existing one.

The ordering of new equipment and software to replace the existing computer systems used for student and graduate records.

The installation of major data communications facilities, the Ericsson MD110 Data feature and the fibre optic Ethernet LAN backbone, which will set the standard for development for several years to come.

While these major developments were the highlights of 1987/88, they should not divert attention from the fact that the main function of the Laboratory, the provision of a reliable computing service to members of College, carried on throughout the year notwithstanding the ongoing staff shortages which again forced the curtailment of a number of activities and a general lowering of standards.

Section 2 Use of Services

The principal services offered are again considered under the following categories:

Mainframe related services Microcomputer related services. Communications

The net running cost of the Laboratory has been apportioned to the first two of these and to the categories of user of each. Communications is seen as a third major service area and is the subject of a descriptive report but it has not been been practicable to isolate it in the quantitative analysis. The basis of the costings is described in more detail in Appendix C. It should be noted that the cost of Library mainframe usage appears exceptionally high this year. This arises from the timing of delivery of the new VAXs and the costing procedure used for the Report which resulted in the bulk of the 1987/88 development funds being applied to the Library machine.

The overall breakdown of Laboratory costs are shown in Tables 1 and 2.

Overall Cost of Services

User	Mainframe	Micro.	Total
Academic	423780	103846	527625
Library	191051	14977	206028
Administration	104659	50117	154776
Total	719490	168939	888430
	Table 1		

Overall Usage Percent of Total Laboratory Cost

User	Mainframe	Micro.	Total
Academic	47.7%	11.7%	59.4%
Library	21.5%	1.7%	23.2%
Administration	11.8%	5.6%	17.4%
Total	81.0%	19.0%	
	Table 2		

The ICL Series 39 and the DECsystem-2060 carried the bulk of the mainframe workload during the year. The DECsystem-2020 was withdrawn from service at the end of Michaelmas term in preparation for the installation of the new VAX equipment and its workload was transferred temporarily to the DECsystem-2060 and the ICL machine. The first of the two new VAX systems, the VAX 8350 for the Library, was installed in mid-April and used for development purposes only for the remainder of the year. A small number of academic users were transferred to this unit on a pilot basis in preparation for the introduction of the main academic VAX at the end of the academic year. The order for the latter machine, originally specified as a VAX8550, was changed in June, at no cost, to a newly announced more powerful VAX6230.

User	Cost of	Mainframe Relat Machine	ed Service General	e s
		Usage	Support	Total
Academic		361116	62664	423780
Library		142590	48461	191051
Administration		53640	51019	104659
Total		557346	162144	719490

Table 3

	Mainframe	Use per Mac	chine	
Machine	у			
	Library	Academic	Admin	TOTAL
DEC2020	7581	303	12709	20593
DEC2060	20100	85096	18574	123770
VAX8350	110228	41336	0	151564
VAX11/780	0	39328	0	39328
PDP11/34	4679	0	0	4679
ICL	2	195054	22357	217413
TOTAL	142590	361116	53640	557346
		Table 4		

Academic Mainframe Use

Faculty	2020	2060	VAX8350	VAX	ICL	TOTAL
Arts (Humanities)	0	651	0	0	859	1510
Arts (Letters)	0	988	0	0	26	1014
Econ. & Social Studies	56	3992	0	0	2616	6664
Eng. & System Sciences	10	34127	21336	39328	74203	169004
Health Sciences	0	2493	0	0	1266	3759
Science	237	42845	20000	0	116084	179166
	303	85096	41336	39328	195054	361117

Number of Academic User Registrations

Faculty	DECsystem-2060	ICL
Arts (Humanities)	7	12
Arts (Letters)	34	2
Bus., Econ. & Social	135	666
Eng. & Systems Sciences	764	1525
Health Sciences	48	38
Science	224	255
TOTAL	1212	2498

Table 6

2.2 Microcomputer related Services

A number of enhancements were made to each of the Ergo machines in the Arches including the addition of a mouse and related software to provide a higher degree of compatibility with the Apple Macintosh units. Access and security arrangements in the Arches, which has been used as a pilot site for operation with minimal staff involvement, worked well and some minor changes were incorporated in the security system in the light of experience to facilitate maintenance and thereby improve availibility of the facilities.

The sale of microcomputer equipment within College is mentioned in more detail in Section 3.1.

User	Microcomputer Machine	Related General	Services
	Usage	Support	Total
Academic	. 52321	51525	103846
Library	4566	10411	14977
Administration	6410	43707	50117
Total	63297	105643	168939

2.3 Communications

2.3.1 Internal Communications

The data facilities of the Ericsson MD110 telephone exchange were commissioned during Hilary term. These permit suitably equipped telephone extensions to connect terminals or microcomputers to the central systems, or to each other, without interfering with their normal simultaneous use for voice communication. This provides a convenient way of providing data connections to sites, such as staff rooms, which already have telephones and also provides a facility, not generally available before, for individual users to connect their equipment to that of others, instead of to the central mainframes only.

The other major communications development was the installation an Ethernet Local Area Network linking a number of major areas of College. This development, which followed naturally from the decisions made earlier in the year regarding the new academic VAX, the Library equipment, the Senior Lecturer's machine, and the forthcoming move to the O'Reilly Institute, consists of a fibre optic "backbone" radiating from a hub in the telephone exchange to "nodes" in the O'Reilly Institute, 200/201 Pearse Street, the Arts Building, the 1937 Reading Room, and West Theatre and provision exists for the connection of additional sites in future. At each node, local Ethernet wiring within the buildings can link individual terminal or computer locations to the system.

These two facilities will form a basis for the orderly growth of data communications within College for several years to come and will permit the gradual replacement of the earlier radial copper network with its Gandalf PACX and the internal X-25 network over the next few years.

2.3.2 External Networking

External network traffic continued to grow during the year and, with the co-operation of the Computer Science Department and the HEANET management committee, a gateway linking HEANET and EUNET, the European UNIX network, went into operation.

A total of £7,837 was paid during the year in communication charges to Telecom Eireann and the EUNET authorities and this was recovered from the earmarked HEANET grant. However, it is by no means certain that the HEA will continue to provide special funding for this activity and it may become necessary to pass the charges on to users of the service.

Section 3. Other Activities

3.1 Sale of Equipment and Supplies

The Computer Laboratory shop had a very successful year and recorded gross sales of £478,889. This unit, which aims to operate on a self-funding basis, acts as a central purchasing unit to channel the benefits of academic discounts and bulk purchasing to members of College. Microcomputers and related accessories and supplies constitute the bulk of the goods sold and the volume of business is an indication of the growth of personal and departmental computing in College.

3.2 Sale of Services

As predicted, the sale of mainframe computer time remained static and can be expected to fall further next year when the DECsystem-2060 is withdrawn. Most of the few remaining outside users, remain because it is cheaper to continue than to move to their organisations' own computers but faced with an enforced change, they are likely to move their work in-house.

Section 4 Future Developments

The immediate major change will be the commissioning of the new VAX6230 machine which was delivered at the end of September and which will replace the DECsystem-2060. The latter machine will be withdrawn from service at the end of Michaelmas term.

The Laboratory's Computer Services Group will move to new accommodation in the O'Reilly Institute in late December, 1988. This will overcome many of the problems associated with the present dilapidated machine room. However, since only one of the department's three units will be accommodated there, considerable operational problems are expected to arise as the staff cope with facilities in multiple locations. It will also distance the Laboratory staff from users since all user terminal rooms will be located in other buildings. Indeed, the absence of firm details of where these will be located is of growing concern.

Other developments in the near future will include the full implementation of the new library software. The testing of this was at an advanced stage at the end of the year and at that time its full implementation was envisaged by late Michaelmas term. The new microvax equipment for the Senior Lecturer's area is also scheduled for installation during the year and work is proceeding on the development of the applications software.

Longer term development is less clear at this stage. The new equipment, communications infrastructure, and applications systems will, hopefully, hearld a period of stability during which growth will take place within the newly defined technical environment in a more structured manner. However, the development element of the Laboratory's recurrent budget is fully committed for several years to funding these recent developments and it is expected that the next few years will represent a period of considerable financial stringency with little scope for expansion.

EQUIPMENT

The specifications of the equipment in service on September 30th, 1988 are as follows:

Digital DECsystem-2060:

- 1 x 2060 CPU with 1024K words of memory and 80 asynchronous communications ports 4 x RP06 200 Mbyte disc drives
- 2 x TU45 120Kb, 9-track, 800/1600 b.p.i. tape drives
- 1 x DN20 synchronous communications port
- 1 x LA36 Console
- 1 x Calcomp Model 81 Plotter
- l x Kaiser Optical Mark Reader

Digital VAX8350:

- 1 x VAX8350 CPU with 32 Mb of memory, an Ethernet port, an X-25 port, and an ULTIMATE co-processor running the PICK system.
- 1 x SA482 2.5 Gbyte disc storage unit
- 1 x RA60 203 Mb disc storage drive
- 1 x TA81 Magnetic Tape Drive
- 1 x LA100 Console printer

ICL Series 39 Level 80

 x Series 39 Level 80 Node with 32Mb of memory and a Scientific unit and three Macrolan switches.
 x FDS2500 2.5 Gb Disc Storage Unit.
 x FDS640 640 Mb Disc Storage Unit
 x GCS 6250 bpi Magnetic Tape Unit
 x ICL 1440 Line Printer

- 1 x DRS20 Operator Console

Digital PDP 11/34:

For real-time Library Circulation Control System:

- CPU with 256K memory
- 8 asynchronous lines
- 2 x RLO1 Disc drives
- 1 x RLO2 Disc drive
- 1 x LA36 Console

<u>Digital VAX 11/780</u>:

- 1 x VAX 11/780 system in the Department of Computer Science comprising the following:
 - Central Processor with 8 Mbyte of memory
 - 80 asynchronous lines
 - 1 x LA120 Console
 - 2 x RA81 456 Mbyte disc drives
 - 1 x RM80 120 Mbyte disc drive
 - 1 x RMO3 67 Mbyte disc drive
 - 1 x TS11 Magnetic tape drive

Communications

It is estimated that over 250 terminals or microcomputers, most of which belong to user departments, have access to the equipment. Most of these compete for the limited number of entry ports on the appropriate computer via a Gandalf PACX IV switching unit. Many of the public terminals which may be booked in advance and located in the Terminal Room of the Laboratory have dedicated ports, however, to guarantee access. The Laboratory is a node of HEANET which links the major HEA funded institutions and is connected to EIRPAC, Telecom Eireann's packet switched public network.

Microcomputers

A selection of microcomputers are available to users in the Laboratory at 200/201 Pearse Street. These include the following:

> 1 x BBC Microcomputer 2 x Apple Macintoshes 1 x Apple II 1 x Apple IIC 1 x IBM PC 1 x Commodore Amiga 1 x Amstrad PCW8256 1 x DEC Rainbow 2 x ICL multi-user PCs

A microcomputer laboratory, located under the railway arches near the parade ground has the following equipment:

16 x ERGO PCs
16 x Apple Macintoshes



COMPUTER LABORATORY Central Equipment

Figure A.1

30-9-88

APPENDIX B

STAFF

The Laboratory staff is organised as shown in Figure B.1. The functions of the main groups are as follows:

ACADEMIC USER SERVICES GROUP

This Group, comprised of programming staff, provides assistance to computer users by means of:

- an advisory service
- courses for users
- publications such as the Users' Guide and Computer Laboratory Newsletter.

COMPUTER SERVICES GROUP

This Group is responsible for the running of the central computer equipment. It is staffed by operations personnel who look after the running of the machines and perform the associated ancillary functions, systems programmers who generate and maintain the central systems and network software, technicians, and janitors who are responsible for security. This Group is also responsible for the provision of specialised technical advice and support on both mainframe, microcomputer, and communications matters to the other two user oriented Groups in the Laboratory.

The sales unit which retails microcomputer equipment and supplies within College is also part of this Group.

INFORMATION SYSTEMS GROUP

This Group is responsible for the regular operation of existing administrative and Library mainframe computer applications and for the development of new ones.

Development of new projects is performed by Systems Analysts and Programmers who design the applications and perform an ongoing supervisory role in the running of the more complex systems.



COMPUTER LABORATORY DRGANISATION

Figure B.1

APPENDIX C

COSTS

The services provided by the Laboratory may be divided into those related to the central mainframe systems and those relating to microcomputers. Furthermore, for each category the Laboratory provides access to machine capacity and assorted support services of an advisory nature.

The total cost of running the Laboratory is shown in Table C.1 under the main expenditure headings used in the College accounts. The cost of providing each services mentioned above was determined by analysing all the categories of expenditure shown in Table C.1 to estimate the fraction of each used to provide each service. For example, in the case of salaries the cost of Systems Analysts is charged partly to Mainframe Support and partly to Micro Support but not to machine service in either equipment category whereas operations staff are charged mainly to the cost of providing Mainframe and Micro machine service. The cost of others such as the Director is distributed over all categories in proportion to the estimated effort spent on each by the individuals concerned.

In the case of Mainframe Machine Service, the expenditure was further apportioned between the ICL system, the DECsystem-2020, the DECsystem-2060, the VAX8350, the PDP 11/34 and the machine operated by the Computer Science Department.

COMPUTER LABORATORY

ACCOUNTS

Year Ended 30 September 1988

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-	£	£
Income:		
Income from Sale		
of Computer Services:	10.079	12.000
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Net Sale of Goods	18,465	0
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Total Income	28,544	12,000
Expenditure:		
Cost of Staff:		
- Salaries	482,173	484,166
- Magaa	15 000	16 000
- wages	1,000	10,000
Total Pay Cost	498,061	500.166
•		
Rentals of Equipment	41,289	32,700
Purchase of Ancillary	150 000	1 (0 - 7 0 0
Equipment	159,006	163,700
Maintenance Consumable Supplies	104,900	140,849
Cost of External Services	7 106	7 600
Insurance Charges	7 684	6,000
Miscellaneous Expenses	6 337	9 900
nibeellaneoub Expenses	0,557	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Total Non-Pay Cost	418,913	400,749
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Total expenditure:	916,974	900,915
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