UNIVERSITY OF DUBLIN

TRINITY COLLEGE

COMPUTER LABORATORY

ANNUAL REPORT 1977/78

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SECTION 1 INTRODUCTION

From a Computer Laboratory standpoint, 1977/78 was marked by the introduction of the DECsystem-20 into regular service and by the development of a new organisational structure. The DEC machine proved satisfactory and so popular with users that its workload built up very rapidly reaching saturation point well before the end of the year. However, this load was balanced by the acquisition of a number of additional features which were installed during the summer and which considerably increased the power and capacity of the machine in preparation for 1978/79. Implementation of the new organisational structure, outlined in Appendix B, commenced during the year. The Academic User Services Group and the Computer Services Group were operating in their new roles by the end of the year but the re-organisation of functions within the Information Systems Group is taking place more slowly on a phased basis. In all cases the full potential of the new scheme will not be realised until some physical re-arrangement of the Laboratory has taken place and while this has almost been completed in the case of the Information Systems Group, it has been seriously delayed by difficulties in the installation of telephones. Delays in the installation of data transmission lines by the Post Office have also caused considerable problems both to the Laboratory and to many users and prevented the new Terminal Room in the Arts and Social Sciences Building going into service.

SECTION 2 MACHINE UTILISATION

2.1 Computer Activity

This year, the analyses of computer activity have been expanded to include activity on the DECsystem-20 which went into regular use at the beginning of the academic year. However, the same costing principles used in previous years have been retained and the basis of these is explained in Appendix C.

As suitable software tools for the recording and analysis of activity on the DECsystem are not yet available, statistics for this machine have not been presented in the same level of detail as those for the System/360. Academic use, for example, has not been analysed into research and teaching activity. However, software to do this is under development and it is hoped that the level of detail of such analysis will improve in the future. On the other hand, the DEC usage recording facilities measure much of the activity of the central control program which cannot be measured on our IBM system and for this reason recorded "Systems Support" usage on the DEC machine is considerably greater than on the System/360.

Perhaps the most striking aspect of the figures is the fact that use of the System/360 continued at almost the same level despite the introduction of the DECsystem-20 and the latter machine was loaded to the limits of its capacity during Hilary and Trinity terms. The potential demand for computing appears to be far from satisfied.

The performance of the System/360 continues to give rise to concern and the difficulties encountered during the year were more severe than might appear from the Maintenance Time shown in Table 12 which refers only to the period when the entire system was inoperative. It does

not reflect very considerable difficulties experienced with peripheral units, particularly magnetic tapes and magnetic disc drives which while not forcing a total closedown severely affected applications which require these devices and caused major disruptions and delay for many users, particularly in the administrative and library areas. It is unrealistic to believe that the situation will change substantially and for this reason efforts to transfer time critical work to the DEC system have been accelerated.

2.2 Ancillary Operations

In the past, all data preparation for administrative and library applications has been performed by Laboratory staff using card punches. However, during the year just ended, this pattern has altered very considerably due to the marked swing to the direct entry of data via terminals which became possible with the introduction of the DEC machine. Terminals are now located in several major user offices, and much of the data entry for admissions, staff and student records, financial applications, and library processing is performed directly by users themselves. The newly formed Information Systems Group in the Laboratory continues to perform data preparation but on a smaller scale and largely by means of terminals.

Analysis of Computer Use

Total Monthly Use per User Category

Month	User Category					Total
	Library	Academic	Admin	Outside	Systems Support	
	£	£	£	£	£	£
10/77	921.67	5389.82	3891.69	400.85	2093.86	12697.89
11/77	1494.60	10278.99	2375.76	507.48	2957.95	17614.78
12/77	1021.15	7119.98	1646.14	255.72	1188.84	11231.83
1/78	940.43	10885.53	2060.69	260.32	1433.31	15560.28
2/78	1337.19	12398.97	2170.19	352.21	3382.00	19640.56
3/78	1002.11	14778.29	2712.52	437.08	5039.54	23969.54
4/78	1412.58	18149.51	2335.20	422.63	6033.55	28353.47
5/78	1563.69	14741.77	2754.38	774.89	7228.27	27063.00
6/78	1509.41	9124.00	2779.95	637.32	4867.28	18917.96
7/78	2000.95	7126.70	3468.82	561.23	7009.22	20166.92
8/78	2951.92	6997.88	2903.79	742.79	5890.90	19387.28
9/78	1327.00	6695.95	3348.96	798.87	5270.71	17441.49
	17462.70	123687.39	32348.09	6151.39	52395.43	232045.00

- "Systems Support" includes all central software maintenance, computer service, administration, and recorded use of the systems by the control programmers.

Table 1

Analysis of Computer Use

Percent of Total Monthly Use per User Category

Month	User Category				
	Library	Academic	Admin	Outside	Systems Support
	%	%	%	%	%
10/77	7.26	42.45	30.65	3.16	16.48
11/77	8.48	58.36	13.49	2.88	16.79
12/77	9.09	63.39	14.66	2.28	10.58
1/78	5.92	69.96	13.24	1.67	9.21
2/78	6.81	63.13	11.05	1.79	17.22
3/78	4.18	61.66	11.32	1.82	21.02
4/78	4.98	64.01	8.24	1.49	21.28
5/78	5.78	54.47	10.18	2.86	26.71
6/78	7.98	48.23	14.69	3.37	25.73
7/78	9.92	35.34	17.20	2.78	34.76
8/78	15.23	36.10	14.46	3.83	30.38
9/78	7.61	38.39	19.20	4.58	30.22
Overall	7.53	53.30	13.94	2.65	22.58

- The percentages in this table are based on the cost distribution shown in Table 1.
- "Systems Support" includes time required for central software maintenance, central systems software operation, and "housekeeping" activities. In addition, it contains certain GUTS use by Library, Academic and Administrative applications which it is not feasible to analyse further.

Table 2

Table 3 Total Annual Use per System per User Category

Machine	User Category					Total
	Library	Academic	Admin	Outside	System Support	
	£	£	£	£	£	£
System/360	14589.95	52342.88	19806.19	3824.79	8267.19	98831.00
DECsystem-20	2872.75	71344.51	12541.90	2326.60	44128.24	133214.00
Total	17462.70	123687.39	32348.09	6151.39	52395.43	233045.00

Table 4 Percent of Total Annual use per System per User Category

Machine	User Category					Total
	Library	Academic	Admin	Outside	System Support	
	%	%	%	%	%	%
System/360	6.29	22.56	8.54	1.65	3.56	42.60
DECsystem-20	1.24	30.75	5.40	1.00	19.01	57.40
Total	7.53	53.31	13.94	2.65	22.57	100.00

Analysis of Terminal Activity

Month	GUTS		TOPS-20	
	Availability (Hours)	Terminal Time Used (Hours)	Availability (Hours)	Terminal Time Used (Hours)
10/77	290	853	728	1095
11/77	413	2320	709	2417
12/77	401	1853	716	1081
1/78	394	2728	706	1395
2/78	306	2191	658	2134
3/78	320	1392	735	4946
4/78	328	1552	680	7616
5/78	314	1256	688	6437
6/78	310	1189	637	3407
7/78	349	689	681	4886
8/78	391	650	637	4146
9/78	408	594	656	3671
Total	4224	17267	8231	43231

Table 5

Analysis of Academic Use by Department – Cost

Department	Cost				Total
	System/360			DECsystem-20 (Note 1)	
	Research	Teaching	Total		
	£	£	£	£	£
Computer Science	4687.72	23968.87	28656.59	46707.21	75363.80
Engineering	2465.38	699.00	3164.38	8207.43	11371.81
Statistics	2307.60	2770.63	5078.23	3108.50	8186.73
Physics	241.84	0	241.84	4554.36	4796.20
Genetics	4291.06	29.81	4320.87	120.33	4441.20
Chemistry	683.58	48.86	732.44	3371.77	4104.21
Community Health	425.47	0	425.47	2489.78	2915.25
Business Studies	53.20	1528.48	1581.68	1083.36	2665.04
Zoology	70.70	2443.06	2513.76	26.47	2540.23
Geography	409.31	849.52	1258.83	32.34	1291.17
Obstetrics & Gynaecology	1219.70	0	1219.70	0	1219.70
Economics	90.27	894.46	984.73	24.52	1009.25
Political Science	345.76	84.10	429.86	0	429.86
Education	279.36	91.41	370.77	57.91	428.68
Pharmacology	359.40	0	359.40	0	359.40
Applied Mathematics	54.20	251.72	305.92	39.27	345.19
Botany	16.00	25.34	41.34	249.46	290.80
Pure Mathematics	13.73	223.09	236.82	5.86	242.68
Psychology	160.68	0	160.68	70.54	231.22
Physiology	0	199.26	199.26	0	199.26
Sociology	2.84	3.69	6.53	167.36	173.89
Biochemistry	24.00	20.76	44.76	1.96	46.72
Social Studies	0.20	4.05	4.25	19.73	23.98
Geology	4.77	0	4.77	0	4.77
Miscellaneous (Note 2)	0	0	0	1006.35	1006.35
Total	18206.77	34136.11	52342.88	71344.51	123687.39

Note 1: It is not possible, at present, to separate research and teaching use of the DEC machine.

Note 2: This is teaching use carried out under a group registration shared by several users before resources were available to issue an individual registration to each user of the DEC.

Table 6

Analysis of Academic Use by Department - Percent

Department	Percent of Total Computer Cost				Total
	System/360			DECsystem-20 (Note 1)	
	Research	Teaching	Total		
	%	%	%	%	%
Computer Science	2.02	10.33	12.35	20.13	32.48
Engineering	1.06	0.30	1.36	3.55	4.91
Statistics	0.99	1.20	2.19	1.34	3.53
Physics	0.10	0	0.10	1.97	2.07
Genetics	1.85	0.01	1.86	0.05	1.91
Chemistry	0.29	0.02	0.31	1.45	1.76
Community Health	0.18	0	0.18	1.07	1.25
Business Studies	0.02	0.66	0.68	0.47	1.15
Zoology	0.03	1.05	1.08	0.01	1.09
Geography	0.18	0.37	0.55	0.01	0.56
Obstetrics & Gynaecology	0.53	0	0.53	0	0.53
Economics	0.04	0.39	0.43	0.01	0.44
Political Science	0.15	0.04	0.19	0	0.19
Education	0.12	0.04	0.16	0.02	0.18
Pharmacology	0.15	0	0.15	0	0.15
Applied Mathematics	0.02	0.11	0.13	0.02	0.15
Botany	0.01	0.01	0.02	0.11	0.13
Pure Mathematics	0.01	0.10	0.11	0	0.11
Psychology	0.07	0	0.07	0.03	0.10
Physiology	0	0.09	0.09	0	0.09
Sociology	0	0	0	0.07	0.07
Biochemistry	0.01	0.01	0.02	0	0.02
Social Studies	0	0	0	0.01	0.01
Geology	0	0	0	0	0
Miscellaneous (Note 2)	0	0	0	0.43	0.43
	7.83	14.73	22.56	30.75	53.31

Note 1: It is not possible, at present, to separate research and teaching use of the DEC machine.

Note 2: This is teaching use carried out under a group registration shared by several users before resources were available to issue an individual registration to each user of the DEC.

Table 7

Analysis of Library Use

Cost

Application	Cost - £				
	System/360			DECsystem-20	Total
	Development and Maintenance	Production	Total		
	£	£	£	£	£
Accessions System	8.04	4308.30	4316.34	-	4316.34
Catalogue System	2285.63	7570.83	9556.46	-	9856.46
SDI Service	21.09	396.06	417.15	-	417.15
Unclassified Use (Note 1)	-	-	-	2872.75	2872.75
Total	2314.76	12275.19	14289.95	2872.75	17462.70

Note 1: It is not possible at present to classify DECsystem-20 library use by type or application

Table 8

Analysis of Library Use

Percent

Application	Percent of Total Computer Use				
	System/360			DECsystem-20	Total
	Development and Maintenance	Production	Total		
	%	%	%	%	%
Accessions System	0	1.86	1.86	-	1.86
Catalogue System	0.98	3.27	4.25	-	4.25
SDI Service	0.01	0.17	0.18	-	0.18
Unclassified Use (Note 1)	-	-	-	1.24	1.24
Total	0.99	5.30	6.29	1.24	7.53

Note 1: It is not possible at present to classify DECsystem-20 library use by type or application.

Table 9

Analysis of Administrative Use

Cost

Application	Cost - £				
	System/360			DECsystem-20	Total
	Development and Maintenance	Production	Total		
	£	£	£	£	£
Accommodation Booking	0	0	0	95.12	95.12
Admissions	32.16	62.06	94.22	2552.49	2646.71
Student and graduate records	1036.81	4867.72	5904.53	6067.98	11972.51
Examination Processing	0	0	0	84.43	84.43
Staff Statistics	0	258.81	258.81	-	258.81
Salaries	200.43	2576.58	2777.01	-	2777.01
Wages	48.02	2152.93	2200.95	-	2200.95
Debtors Ledger including Fees and Incidentals	337.10	4323.45	4660.55	-	4660.55
Creditors Ledger	0	480.48	480.48	-	480.48
Nominal Ledger	0	2158.03	2158.03	-	2158.03
Unclassified Financial Use	1271.61	0	1271.61	3741.88	5013.49
Total	2926.13	16880.06	19806.19	12541.90	32348.09

Note 1: It is not possible at present to fully analyse DEC system use.

Table 10

Analysis of Administrative Use

Percent

Application	Percent of Total Computer Use				
	System/360			DECsystem-20 (Note 1)	Total
	Development and Maintenance	Production	Total		
	%	%	%	%	%
Accommodation Booking	0	0	0	0.04	0.04
Admissions	0.01	0.03	0.04	1.10	1.14
Student and graduate records	0.45	2.10	2.55	2.62	5.17
Examinations Processing	0	0	0	0.04	0.04
Staff Statistics	0	0.11	0.11	-	0.11
Salaries	0.09	1.11	1.20	-	1.20
Wages	0.02	0.93	0.95	-	0.95
Debtors Ledger including Fees and Incidentals	0.15	1.86	2.01	-	2.01
Creditors Ledger	0	0.21	0.21	-	0.21
Nominal Ledger	0	0.93	0.93	-	0.93
Unclassified Financial Use	0.54	0	0.54	1.60	2.14
Total	1.26	7.28	8.54	5.40	13.94

Note 1: It is not possible at present to fully analyse DEC system use.

Table 11

System/360

Total Elapsed Hours

Month	Machine Use				Maint-enance	Total Activity
	GUTS	OS Alone	Other	Total		
10/77	289.60	305.13	0	594.73	0.37	595.10
11/77	412.76	215.55	0	628.31	0	628.31
12/77	400.57	132.77	0	533.34	0	533.34
1/78	394.03	172.72	0	566.75	11.93	578.68
2/78	306.03	232.00	0	538.03	17.32	555.35
3/78	320.20	234.82	0	555.02	5.28	560.30
4/78	327.97	249.25	0.67	577.89	0	577.89
5/78	313.77	264.75	0	578.52	139.12	717.64
6/78	309.90	211.05	1.55	522.50	16.22	538.72
7/78	348.53	221.37	0.35	570.25	0	570.25
8/78	390.88	228.33	0	619.21	6.00	625.21
9/78	408.31	124.37	0	532.68	2.00	534.68
Total	4222.55	2592.11	2.57	6817.23	198.24	7015.47

Table 12

DECsystem-20 Availability

Month	System Down-time - Hours					Availability	
	Engineering		Environment Problems	Software Problems	Total	Hours	%
	Scheduled	Unscheduled					
10/77	9.00	2.00	0.83	3.83	15.66	728.34	97.85
11/77	3.00	4.00	0.33	4.00	11.33	708.67	98.33
12/77	7.00	13.00	0.75	7.17	27.92	716.08	96.24
1/78	6.00	25.50	1.00	5.42	37.92	706.08	94.89
2/78	4.00	4.00	0.50	5.67	14.17	657.83	97.77
3/78	3.00	1.00	1.00	4.42	9.42	734.58	98.66
4/78	19.40	6.63	0.17	13.55	39.75	680.25	94.44
5/78	9.43	38.48	2.27	5.77	55.95	688.05	92.47
6/78	21.03	58.38	0.63	2.87	82.91	637.09	88.47
7/78	6.62	1.57	52.63	2.28	63.10	680.90	91.40
8/78	12.58	88.92	2.70	3.15	107.35	636.65	85.48
9/78	29.82	0.12	3.12	30.85	63.91	656.09	91.11
Overall	130.88	243.60	65.93	88.98	529.39	8230.61	93.96

Table 13

SECTION 3 APPLICATION DEVELOPMENT

3.1 Academic

As in other application areas, the impact of the DECsystem-20 has been the most noticeable feature. As well as increasing the available computing capacity, it has led to increased use of interactive working and its speed and size have made possible the processing of large computational programs which could not have been handled on the System/360. During the year, the Academic User Services Group was strengthened and established on a more formal basis as part of the overall Computer Laboratory re-organisation and has resulted in a marked improvement in service in this area.

3.2 Library

The efficiencies introduced in the computer processing procedures in the Library are again reflected in the decrease in machine resources needed to process the ever increasing number of records. As a result of a comprehensive study carried out during the year, the catalogue system was modified to use computer-output-microfiche instead of the microfilm used previously and the new form of catalogue went into regular use at the end of September. The biggest task to be undertaken in the Library computing area in the immediate future is the conversion of the existing applications to operate on the DECsystem-20. During the year, a detailed study was made of this problem and in view of the many additional facilities available on the new machine it was decided to proceed with the implementation of a new and much improved cataloguing system rather than expend a considerable amount of effort merely copying the existing one. The outline design of the new system was completed in June 1978 and detailed work began in September.

3.3 Administration

During the year, the process of integrating the operational and development aspects of administrative data processing into the Information Systems Group as part of the Laboratory re-organisation commenced and initial experience of the new arrangement has been very encouraging. The use of terminals for direct data entry by user departments continued to expand during the year with the installation of terminals in the Accountant's Office, the Admissions Office, the Staff Office and in Student Records. Most development effort went into the transfer of existing applications from the System/360 to the DEC and by the end of the year, the Student Record system was fully operational on the latter machine and some of the ledger applications were in an advanced stage of conversion. One of the biggest projects undertaken during the year was the development and implementation of a new set of Admissions computer procedures. Because of the short time available for the completion of this project, the services of an outside programming consultant were obtained to supplement the Laboratory resources and proved very satisfactory.

SECTION 4 CENTRAL SERVICE DEVELOPMENT

4.1 Hardware

A number of significant additions were made to the DECsystem-20 during the last quarter of the academic year. Its main memory was doubled in size from 128K to 256K words, two additional RP06 disc storage drives were installed bringing the total on-line file capacity to 800 megabytes, and the number of terminal entry ports was increased from 16 to 32. The original machine represented the minimum viable DECsystem-20 configuration and these enhancements should make it possible to carry the additional work which will be transferred to the system during the coming year and still provide an adequate quality service to users.

Four additional dial-up Post Office lines for data transmission, originally expected in the summer of 1977, were eventually installed in September 1978 and while these were primarily intended for inter-university use, they are now expected to be of considerable value to College users in outlying parts of the main site who are unable to get internal data transmission lines from P & T and are forced to link with the computer through the public network. The delay in the provision of internal data transmission lines by the Post Office has also made it necessary to defer the installation of terminals in the Arts and Social Sciences Building. The data transmission line installed to the UCD Computer Centre did not go into regular operation during the year because of the delayed delivery of the DEC communications controller. However, a courier service was organised so that TCD users had access to the plotting equipment in UCD and limited use was made of this.

4.2 Software

During the year efforts were concentrated on building up the repertoire of general purpose application software packages for the DEC machine to provide improved replacements for those currently available on the System/360. Among the major packages acquired were the IMSL mathematical subroutine library and GPSS10 simulation package. The library of programs contributed by other DEC users and distributed through DECUS, the DEC users' organisation, was also acquired and a comprehensive Catalogue of Programs was produced to assist users in the choice of application packages.

5.1 Teaching and Publications

The Computer Laboratory Newsletter appeared on four occasions during the year and a completely revised edition of the Users' Guide was also produced. In addition, a comprehensive Catalogue of Programs available in the Laboratory has been published together with some pamphlets on specialised topics. An introductory course on the DECsystem-20 and on Fortran programming was given by the User Services Group, and, as in other years, lectures were given by the Assistant Director to medical undergraduates and by the Director to MBA students.

5.2 Sale of Services

The revenue from sale of computer service rose to £13,616 from £11,632 last year. It must, however, again be stressed that this income is relatively precarious due to the very small number of customers involved and the installation of a new computer system in the spring of 1978 by a major user may offset any increase during the coming year.

5.3 External Contacts

The Laboratory continued to be active in DECUS, the DEC users' group and the Assistant Director was elected chairman of the Irish branch of the organisation. The Operations Manager represented the Laboratory at the DECUS 1978 European conference and a number of other staff attended regional meetings, one of which was held in College in January. The library Systems Analyst represented the Laboratory at the MARC Users' Conference in Loughborough in September.

SECTION 6 FUTURE DEVELOPMENTS

The withdrawal from service of the IBM System/360 is now receiving detailed consideration in view of its increasing age and deteriorating performance. The conversion of critical Library and administrative programs for operation on the DEC machine is proceeding very satisfactorily and it now seems that by the end of 1979 the 360 Model 44 will no longer be essential in these areas. After that time, therefore, its withdrawal will depend mainly on its performance, maintenance cost, and most importantly on the rate at which the DEC can be built up to assume the entire workload and proposals based on this have been presented to the HEA Advisory Group on Computer Services.

Following the initial limited exchange of computer work by UCD, Maynooth, and TCD, proposals have been agreed, subject to the availability of funds, for the provision of fast dial-up facilities at each of the university computer centres as a further step towards the formation of a Irish universities' computer network.

APPENDIX A

EQUIPMENT

The specifications of the equipment currently installed are as follows:

IBM System 360:

1 x IBM 2044 Model H Central Processing Unit with 262,144 bytes (256K) of core storage and with

- One Multiplexor Channel
- Two high speed multiplexor channels
- Single disc storage drive in CPU
- Store and fetch protection
- Floating point arithmetic
- Console printer keyboard
- Interval timer
- Commercial Feature (Full 360 instruction set)
- High Speed General Registers

1 x IBM 2941 Model 1 Storage Control with

- File Scan
  and
- Record Overflow

1 x IBM 2415 Model 4, Magnetic Tape unit and Control (2 drives) with 9-track compatibiiity, i.e., 800 b.p.i. tape at 15000 b.p.s. or 1600 b.p.i. tape or 30000 b.p.s.

1 x IBM 2821 Model 2 Control Unit (for 1403 printer)

1 x IBM 1403 Model 2 Printer with Universal
Character Set feature and interchangeable
Chain Cartridge adapter
Print Positions: 132
Maximum Rated Speed: 600 lines/minute
Chains: Normal - PN3
Also available: TN modified for Library Use & QN2

1 x IBM 2501 Model B2 Card Reader with Card Image Feature

1 x IBM 1442 Model N2 Card Punch with Card Image Feature
Speed: 91 to 256 cards/minute depending on
number of columns punched.

1 x IBM 1053 Model 4 Printer with pin-feed platen and
accelerated carriage return

4 x IBM 2311 Model 1 Direct Access Storage Units

1 x IBM 2314, 2312 and 2312 Model A1 Direct Access
Storage Facility (5 spindles)

1 x IBM 3704 Transmission Control Unit

Burroughs B1700:

1 x B1700 System in the Department of Computer Science
comprising:
- B1714 CPU and SPO including 64K memory
- A9480-12 Dual Disc Unit
- A9115 Card Reader
- A9359.2 Line Printer

DECsystem-20:

1 x 2040 CPU with 256K words of memory and
32 asynchronous communication ports

4 x RP06 200 Mbyte disc drives

2 x TU45 120Kb, 9-track, 800/1600 b.p.i.
tape drives

1 x CD20-A 300 card/minute Card Reader

1 x LP20-AB 300 line/minute 64 character printer

Terminals:

To IBM System only:

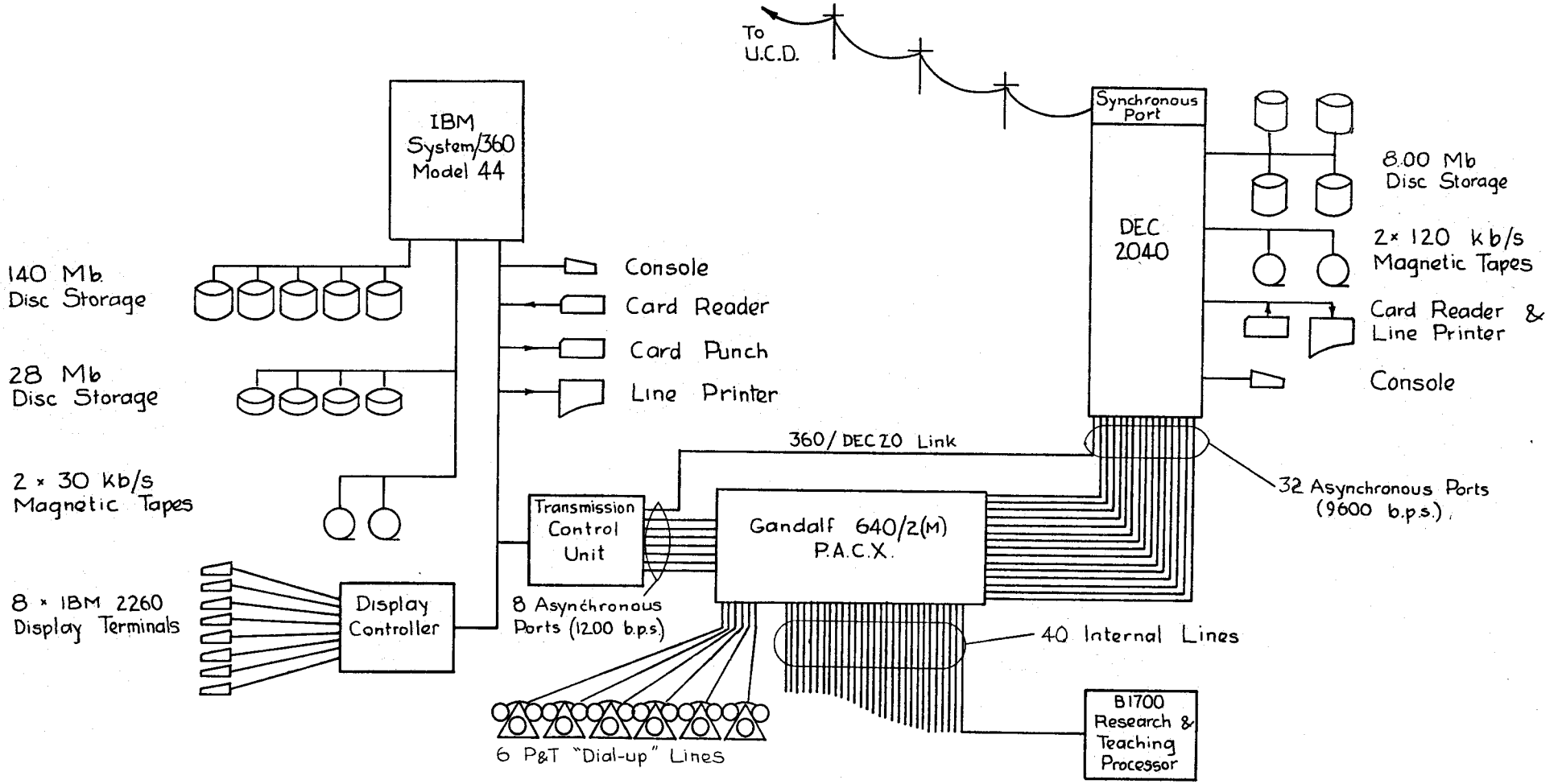
8 x IBM 2260 Display Stations Model 1
with alphanumeric keyboards

To IBM or DEC Systems, via a CASE 640/2(M) PACX:

10 x Hazeltine 1500 Visual Display terminals

1 x LA36 DECwriter printing terminal

In addition to the above terminals which are located in public areas for general use, 12 Laboratory terminals are located within user departments and a number of user owned machines have access to the system.



INSTALLED AND "ON-ORDER" EQUIPMENT CONFIGURATION - 30.9.1978

FIGURE A.1

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.

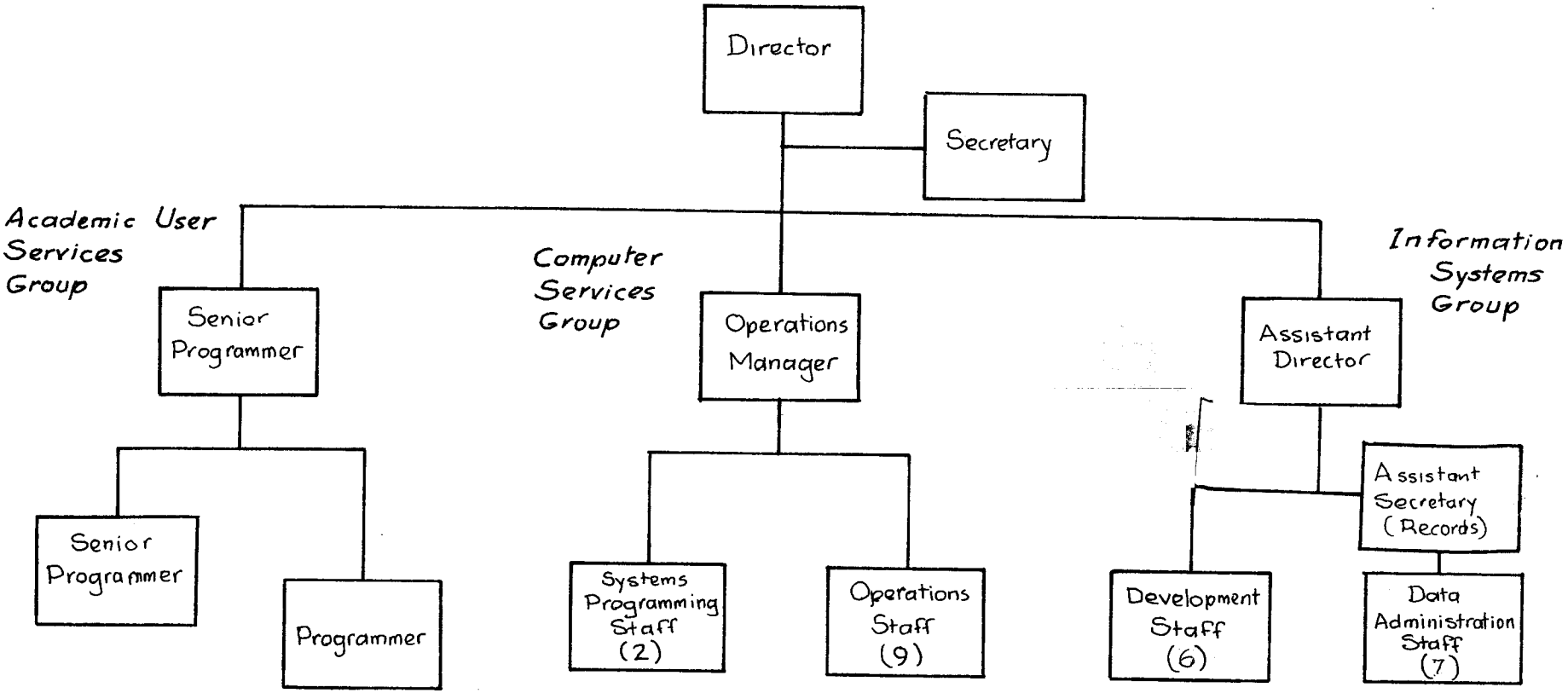
COMPUTER SERVICES GROUP

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 software, and janitors who are responsible for security.

INFORMATION SYSTEMS GROUP

This Group is responsible for the regular operation of existing administrative and Library computer applications and for the development of new ones. The operational aspects are performed by Data Processing Assistants and by the staff of the Student Records Office, now incorporated in the Group.

Development of new projects is performed by Systems Analysts who design the applications and Programmers who write and test the computer programs needed for their implementation.



COMPUTER LABORATORY

ORGANISATION

30 September 1978

Figure B.1

APPENDIX C

COSTS

The services provided by the Laboratory may be divided into three groups:

1. Computer Service consisting of computer time together with the appropriate materials and supporting facilities. This is available to all college departments and to outside users.

2. Application Development Service

   This is a full systems analysis and programming service provided for library and administrative applications design. The Laboratory staff who perform this work normally use the "Computing Service" and "Data Preparation Service" for test purposes on behalf of the user departments.

3. Data Preparation Service

   This consists of card punching, data entry via terminals, and the assembly of data for processing. It applies mostly to library and administrative data processing.

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 of the three services was determined by analysing all the categories of expenditure shown in Table C.1 to estimate the fraction of each used to provide each of the three services. For example, in the case of salaries the cost of Systems Analysts is charged to Application Development, Operators to Computer Service, while the cost of others such as the Director is distributed over the three in proportion to the estimated effort spent on each by the individuals concerned.

For the purpose of "charging", this analysis was carried out at the beginning of the year on the budget figures and the resulting estimated cost of Computer Service, suitably apportioned between the System/360 and the DECsystem-20, was used as a target to be recovered during the year. In the case of the 360, this together with estimates of the level of usage were used to determine the rates to be charged for use of the system. These rates are shown in Table C.2. In the case of the DECsystem-20, however, implementation of charging procedures was not possible pending the development of suitable software.

At the end of the year when the actual costs of running the Laboratory were known, the proceeds of System/360 charging were scaled appropriately and the records of time used on the DECsystem-20 were manually costed for use in this report.

Table C.3 shows use of the three services by user category.

COMPUTER LABORATORY

ACCOUNTS

Year Ended 30 September 1978

Expenditure:

	Actual	Budget
Cost of Staff:	£	£
- Salaries	130,440	136,061
- Wages	8,125	8,013
Rentals of Equipment	20,322	19,700
Purchases of Ancillary Equipment	74,400	73,500
Maintenance	47,919	50,100
Consumable Supplies	12,820	11,000
Cost of External Services	12,330	5,900
Insurance Charges	1,709	2,000
Miscellaneous Expenses	2,964	3,400
Recurrent Cost for Year	311,029	309,674

Income:

Income from Sale of Computer Services - £13,616

This includes income amounting to £3,229.51 from computer use by externally funded research activities undertaken by the following departments:

Applied Research and Consultancy:	£2,366.57
Business Studies	77.42
Statistics	785.52
	£3,229.51

Table C.1

UNIVERSITY OF DUBLIN
TRINITY COLLEGE
COMPUTER LABORATORY

INTERNAL RATES

System/360

Charges applicable to Normal Batch and GUTS Work

Virtual Time (Note 1)	£0.10	per requested 2Kb/hour
CPU Time	£6.46	per hour
2311 Disk I/O	£0.0003	per EXCP
2314 Disk I/O	£0.0002	per EXCP
2415 Tape I/O	£0.0004	per EXCP
Special Diskpack or Tape Mounting (Note 2)	£0.50	per volume
Input via HASP	£0.0002	per card image
Output via HASP (Note 3)	£0.0002	per line image
	£0.0073	per card punched
Special Printer Set-up	£1.00	per set-up

Additional Charges for GUTS Work

"Log-on" Time	£0.0236	per minute
Input from Terminal	£0.0002	per line
Output to Terminal	£0.0002	per line
Foreground Execution (T.S)	£0.020	per second

Note 1 Virtual Time is an artificial approximation to elapsed time based on an amalgam of several factors and is the basis for charging for memory occupancy.

Note 2 Requests for 2314 disk mounting will not normally be entertained.

Note 3 In the case of 1403 output this includes the cost of standard single part stationery.

Table C.2

Analysis of Service Costs

User Category	Computer Service (Note 1)	Application Development Service (Note 2)	Data Prep. Service	Total
Academic	159761	0	225	159986
Library	22556	20835	2740	46131
Administrative	41783	46435	8400	96618
Outside	7945	0	349	8294
Total	232045	67270	11714	311029

Note 1: "Systems Support" use is included as an overhead in these costs.

Note 2: This breakdown is approximate and based on the total development cost distributed in proportion to the number of development staff assigned.

Table C.3

APPENDIX D

GLOSSARY

CPU	:	Central Processing Unit, the major component of a computer system. In the College there are three CPUs, an IBM 2044, a DEC 2040, and a Burroughs B1714.
CPU Time	:	Time during which the CPU is actively processing and not waiting for a peripheral device to complete some ancillary operation.
DECUS	:	A Digital Equipment Corporation computer users' group.
Development Use	:	Use of the system by systems analysis and programming staff for the development of new applications or of major enhancements to existing ones including the productive running of new programs prior to their transfer to the data processing or administrative staff for routine use.
Elapsed Time	:	Overall time span from start to finish on the whole system. Individual components may not be active for all of this period.
GUTS	:	Gothenburg Universities Terminal System. A comprehensive set of control and service programs to permit the use of keyboard terminals for general computing purposes on an IBM system operating under O.S. with HASP.

HASP	:	The Houston Automatic Spooling Program. A control program to marshal the queue of incoming jobs, schedule them for processing, and release their results to the appropriate output device. It works in conjunction with O.S.
Maintenance Use	:	Use of the machine by systems analysis and programming staff for the maintenance of existing programs.
Modem	:	Modulator-demodulator unit, one of which is normally required for signal conversion purposes at each end of a data transmission line.
O.S.	:	Operation System/360. The main control software used on the IBM System/360.
P.A.C.X.	:	Private automatic computer exchange. A device, similar to an automatic telephone exchange, which enables many terminals to compete for access to a limited number of entry ports on one or more computers.
Port	:	An entry channel through which one terminal at a time can communicate with the computer. Ports may be "synchronous" or "asynchronous", depending on the communications technique used. The former are normally used for high speed communication only.
Production Use	:	Use of the computer by data processing or administrative staff for routine productive work.

SDI Service	:	The current awareness service based on individual interest profiles operated by the Library.
SEAS	:	The SHARE European Association. A European association of scientifically oriented users of large IBM computers.
TOPS-20	:	The main control program on the DECsystem-20.