THE JOHN E. ANDERSON GRADUATE
SCHOOL OF MANAGEMENT AT UCLA

Seventh Annual UCLA Survey of Business School Computer Usage

September 1990

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Executive Summary

This Seventh Annual UCLA Survey of Business School Computer Usage focuses on the computer-related services provided by AACSB accredited business schools and the costs of those services. This year, 145 schools completed four pages of questions detailing the computer staff, services provided to user groups, the computer center operating budget, capital expenditures, and sources of funds for the 1989-90 academic year. With each budget entry, the respondents indicated a confidence level regarding the accuracy of that entry. In general, the confidence level was quite high, 85-90%, which contributes towards the validity of the overall findings.

Additionally, the schools provided estimates of student microcomputer ownership, innovative uses of technology, and updated (or provided) two pages of hardware information. Tables detailing both the business school-owned mini/mainframes and microcomputers are continued from the earlier surveys. The sample continued to be demographically similar to the previous surveys.

The total computer operating budget reported by 133 business schools was $39,610,000, an average of $298,000 per school. A computer dollar per student statistic was used to separate the schools into quartiles. For the 131 schools providing the necessary data, the median quartile computer operating budget expenditures per student were $560, $107, $43, and $14. The survey data suggests that the schools in the 1st quartile continued increasing their computing support allocation whereas the allocations by the schools in the other quartiles have remained the same or decreased slightly. These quartile differences in expenditure per student were reflected in the technological infrastructure of the schools.

Business school computer operating budgets were primarily allocated for staff salaries and equipment maintenance and service. However, the percent of allocation was distributed differently across the quartiles, with the 4th quartile schools allocating more of their funds to consumables, software, and data acquisition.

Regarding capital expenditures, for the 123 schools reporting data, the total spent was $13,086,000, an average of $106,000 per school. Microcomputer system acquisition received the greatest emphasis, especially in the 4th quartile. The majority of funds for computer operations and capital were provided by the schools or universities themselves, with only 6% of the funds coming from cash grants or contributions.

Just over half of the 126 schools reporting data experienced budget increases from last year, while only 41% anticipate increases for next year. Eight percent of the schools experienced decreases from last year, and 15% are anticipating budget cuts.

For the 108 schools providing data regarding their own autonomous computing staff, the computer staff salary totaled $17,620,000, with an average of $163,000 per school. However, this figure is misleading, as the 1st and 2nd quartile schools accounted for 86% ($15,065,000) of this total. The allocation distributions show that the 3rd and 4th quartile schools rely heavily on central university computing staff and/or part-time student staff for support.

Ninety-one schools provided the requisite financial, staff, and service data for the salary and service cost analyses. For these schools, the average total staff cost was just over $185,000. Staff salaries (when equated to one FTE) increased by staff category, from academic user support, technical support, computer facilities management, to administrative user support. By user group, 73% of the computer staff costs were directly allocated towards academic support and 27% to administrative support. When equated to one FTE, the costs gradually

increased according to the user group served, from undergraduate, MBA, faculty, administrative staff, to executive program.

Service costs (when equated to one FTE) varied, with training and consulting being the least expensive to provide and data acquisition and programming the most expensive. However, training and consulting received 30% of the total staff costs, while the other two received only 18%. In the total service cost matrix, one item, consulting to individual users provided by academic user support staff, accounted for 12% of the total cost. The next highest item was programming services provided by administrative user support and accounted for 7% of the total cost. All other items in the service cost matrix accounted for 5% or less.

Table 2 (page 5) presents financial and technological infrastructure summaries for the 131 schools as a total, and then as separated into quartiles based on computer operating budget expenditures per student.

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1. Introduction

The purpose of the UCLA annual surveys of business school computer usage is to provide deans and other policy makers with information they can use in making allocation decisions and program plans with regard to computing. The particular focus of this, the Seventh Annual UCLA Survey of Business School Computer Usage, is to provide details regarding computer-related services and the costs to provide those services. Again, as in the previous reports, the reader is cautioned that these surveys reflect only what schools report they are doing and is not an endorsement of what they should be doing. The reader is reminded that the data was collected in the first three months of 1990.

The First, Second, Fourth, and Sixth Surveys presented information on the hardware, software, and other computer resources of the business schools. The Third Survey focused on computer-related issues of major concern to the deans, while the Fifth approached business school computerization in terms of process, emphasizing that the introduction and use of technology is continuous and that the schools were not only approaching computerization differently and at different rates, but were also dealing with different issues at different points in their process[1].

This Seventh Survey follows the "every other year" pattern of converging on a major issue. This year the issue concerns the general cost of computing at the business schools, more specifically operating costs, capital expenditures, and the cost of computer staff and services. With the increased use of information technology in business schools, it is important that the resource implications be understood, both in terms of services and costs. Beyond the basic computer equipment, support of a sophisticated technological infrastructure requires a capable staff providing a wide range of services to a variety of users.

Even though accurate financial data is extremely difficult to capture and wide variations are seen in budget category definitions, an overall understanding of what business schools perceive they are spending on computing related to the services they are providing is of critical value to planning and decision making. In several instances, the aggregated financial data has been further divided into quartiles to provide a more appropriate representation of the differences across the schools. The criteria for the quartile division is based on the computer operating dollars spent by the school per student.

Additionally, data detailing the mini/mainframe and microcomputer hardware resources available at the business schools is continued as in the previous surveys. Throughout this report, where appropriate and available, comparable hardware data from the Second (1985), Fourth (1987), Fifth (1988), and Sixth (1989) Surveys are also included. However, as the same sample of business schools are not followed over a period of time, these surveys do not comprise a longitudinal study. Rather, the survey samples are composed of accredited business schools which wish to contribute their data. Comparisons between the years may, therefore, be somewhat misleading. However, because of the general similarity between sample composition across the surveys, conclusions regarding general trends may be suggested.

The sample size (N) varies across many of the tables and figures in this report as a function of the number of schools providing data to a particular question. For example, some questions may not be applicable to a school (e.g. no mini/mainframe data) or a school may deliberately choose not to respond to a particular question (e.g. some of the financial data).

This report is divided into five sections: Introduction, Profile of Surveyed Schools, Budgets, Computing Staff Salaries and Services, and Hardware (mini/mainframes and microcomputers). Four appendices detail demographics by school, operating budget category

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1 The Second, Fourth, Fifth, and Sixth Surveys have been published in the Communications of the ACM, Volume 29, No 1 (1986), Volume 31, No 7 (1988), Volume 32, No 1 (1989), and Volume 33, No. 5 (1990), respectively.

details, mini/mainframe and microcomputer resources by school, and innovative uses of information technology.

2. Profile of Surveyed Schools

The population for the Seventh Survey was the schools currently accredited by the American Assembly of Collegiate Schools of Business (AACSB) and seven Canadian business schools which had participated in previous surveys. Of the 274 schools available for participation, 145, (53%) completed the six-page questionnaire. Seventy-five percent of this year's respondents (the individual responsible for coordinating the answers to the questionnaire) were divided evenly among assistant deans, computer center directors, and faculty members. Other respondents, (deans, other directors, and computer committee members) each represented less than 10%.

The business schools that participated in this survey are identified in Appendices 1 and 3. Seventy percent (114) of the 163 business schools in the Sixth Survey also provided data for the Seventh Survey[2].

Table 1 displays general demographic information for the 145 schools in this year's sample together with data from previous survey samples. For most of the categories given in Table 1, the data has been consistent over the past six years. For 1985, 1987, 1988, 1989, and 1990, for example, between 67 and 70% of the sample have been public schools. The slight decrease in this year's participation by private schools, from 32 to 30%, was due to the hesitation by some private schools to release the financial data. The level of degree programs offered remains about the same. Student enrollments, as full-time equivalents (FTE), continue to show slight fluctuations over the six year time period, yet still maintain a pretty even distribution across the full range of school sizes. Finally, this year's sample shows the largest percent to date of the schools with access only to their own mini/mainframes, 10%, as compared to 4-7% in the earlier surveys. Overall, the aggregate sample demographics have remained quite consistent over time.

Appendix 1 presents information on a school-by-school basis regarding the type of school, student FTE enrollments, faculty FTEs, computer operating budget, computer dollar per student, computer operating budget as a percent of total business school budget, student to computer staff ratios, and computer fee collections.

3. Budgets

Financial data is extremely difficult to capture and significant variations occur in budget categories, as well as in the definitions of these categories, for a specific school's budget. Nevertheless, an overall understanding of what business schools perceive they are spending on computers and related services is critical to planning and decision making. For the 1990 survey questionnaire, the basic structure for the computing budget was taken from the Computer Services Operating Budget at the John E. Anderson Graduate School of Management at UCLA. This budget format was reviewed and modified as per the suggestions of several other major business school computer center directors. Based upon the high response rate and the comments received, this basic budget structure was adequate to express the financial situation at the responding schools.

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2 The complete SAS files of the Second, Fourth, Fifth, Sixth, and Seventh raw data are available to interested researchers. Please contact the Information Systems Research Program, Anderson Graduate School of Management, University of California, Los Angeles, CA 90024-1481.

Table 1
Demographics of Surveyed Schools
(percent of schools)

	Seventh 1990 N=145	Sixth 1989 N=163	Fifth 1988 N=175	Fourth 1987 N=128	Second 1985 N=125	First 1984 N=35
Type of school: Public	70	68	68	67	69	49
Private	30	32	32	33	31	51
Degrees offered:						
Undergraduate only	3	3	2	2	2	
Undergraduate & graduate	86	89	88	85	86	66
Graduate only	9	7	10	13	12	34
No data	2	1				
Student enrollment (FTE):						
Less than 1000 students	23	22	24	25	22	37
Between 1000 and 2000	28	26	21	27	22	23
Between 2000 and 3000	20	20	23	24	26	20
More than 3000 students	27	31	32	24	30	20
No data	2	1				
Mini/mainframe facilities:						
Both school & university	27	31	34	29	27	54
School only	10	6	6	7	4	6
University only	58	59	56	60	64	40
No data	5	4	4	4	5	

The financial data was divided into three areas in the questionnaire, the operating budget, capital expenditures, and sources of funds. The operating budget information included seven major categories: staff salaries, equipment maintenance and service, consumables, software, data acquisition, telephone and line charges, and miscellaneous. With each budget figure entry, the respondent was asked to indicate a confidence level regarding the accuracy of that entry. For the 33 operating budget entries, the average confidence level was 83%, with the categories ranging from 79% for the confidence level for consumables to 89% for staff salaries. The separate item averages ranged from 77% for diskettes/tapes and magnetic media in the consumables category to 91% for full-time computer facilities management and clerical salaries.

The capital expenditures were grouped into four categories: complete microcomputer systems, mini/mainframe systems, communication equipment, and facility renovation. For these four entries, the average confidence level was 85%, with the item averages ranging from 77% for facility renovation to 92% for mini/mainframe systems.

The sources of funding had six major categories: business school/university, state and/or government, cash grants and contributions, direct service charges, university reallocation funds, and other. The mean confidence levels for the item entries and the total source of income was 89%, ranging from a low of 73% for the business school and/or university sources to a high of 94% for the other sources. In general, the confidence of the respondents in the accuracy of their data was quite high and contributes towards the validity of the overall findings.

A comment must be made about terminology. As this survey was answered three quarters through the academic year for most of the schools, the general word "expenditure" is used to indicate a budget entry, even though it is recognized that a response may be

comprised of both actual amounts expended to date and amounts allocated for the rest of the 1989-1990 year.

3.1 Budget Totals and Computing Dollars Per Student

Two summary budget figures were requested of the schools, the total annual business school operating budget and the total annual computer operating budget. Ninety-six (66%) schools reported their total school budget, 133 (92%) their computer operating budgets, and 93 (64%) reported both. Even though the total sample of this Seventh Survey is slightly smaller than the Sixth's, 145 compared to 163, more schools provided financial data. For instance, 133 schools provided computer operating budget data for this survey, while only 126 (77%) of the schools provided the data for the Sixth Survey.

For the 133 schools providing data, the computer operating budget ranged from $4,214 to $5,500,000 with a mean of $297,890. The sum of all of the computer operating budgets was just over 39.6 million dollars. For the 93 business schools providing data for both budgets, on the average, the computer operating budget was approximately 3.6% of the total school budget, slightly lower than 3.8% in the Sixth Survey (1989), but still higher than the 3.3% in the Fourth Survey (1987), and 3.0% in the Second Survey (1985).

To allow comparison across the business schools and to assist in interpretation, the computing operating budget was converted into a dollar per student statistic by dividing the reported computer operating budget by the total student FTE. For the 131 schools providing this data, the median quartile expenditures per student were $560, $107, $43, and $14, respectively, as shown in Figure 1. This survey data suggests that the schools in the 1st quartile continue to increase their allocation of computing support whereas the schools in the 2nd quartile again decreased their allocations. The 3rd and 4th quartile schools stayed just about the same. For the schools providing the necessary data, this statistic has been calculated and is shown in Appendix 1 in the fourth column from the right, labelled COMP BDGT/STUDENT($).

Figure 1
Median Computer Operating Budget Expenditure by Quartiles

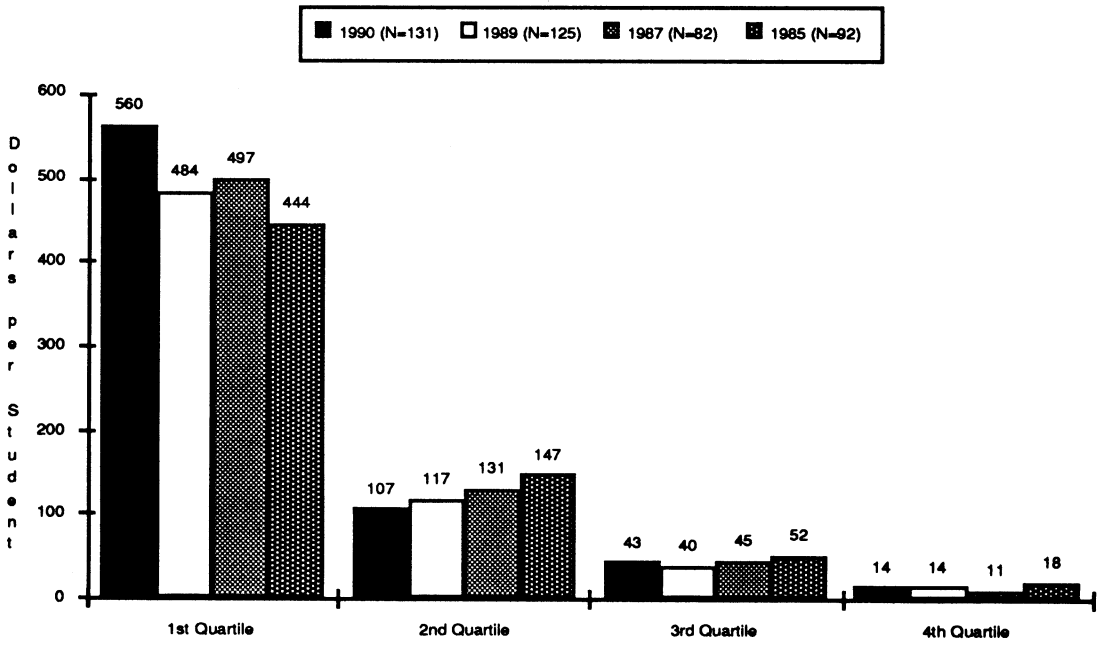

Table 2
Business School Computer
Financials and Technological Infrastructure
by Computer Dollar per Student Quartiles
1989 - 1990

	Total		1st Quartile		2nd Quartile		3rd Quartile		4th Quartile	
	N=131	Mean	N=33	Mean	N=33	Mean	N=33	Mean	N=32	Mean
Operating Budget ($000s)	131	39384	33	25358	33	8424	33	3936	32	1464
Average per school		301		768		261		119		46
As % of total school budget	92	3.6	24	4.9	27	4.3	20	2.3	21	2.4
As dollar per student	131	213	33	666	33	124	33	44	32	14
(Range)		(2 - 3222)		(226 - 3222)		(67 - 219)		(27 - 66)		(2 - 26)
Capital Expenditures ($000s)	123	13334	32	5121	31	4223	32	2332	28	1658
Average per school		108		160		136		73		59
Computer Staff	109	863	33	400	31	244	29	165	16	54
Total FTE average per school		7.9		12.1		7.9		5.7		3.4
Full-time FTE average per school	90	4.4	32	7.5	29	3.3	22	2.1	7	1.4
Part-time FTE average per school	96	4.9	30	5.3	30	4.9	24	4.9	12	3.7
Mini/mainframes	51	84	16	34	21	31	8	12	6	7
Average per school		1.6		2.1		1.5		1.5		1.2
Microcomputers	130	26076	33	8646	33	6902	32	5409	32	5119
Average per school		201		262		209		169		160
Average percent networked	113	0.61	30	0.76	29	0.62	27	0.49	27	0.53

To provide a standardized means of interpreting the subsequent financial material, the computer dollar per student quartile separation of business schools displayed in Figure 1 is used as the criteria throughout this report. For example, if a school fell into the first quartile on computer dollar per student, it remained in the first quartile for all of the subsequent financial quartile presentations.

Table 2 presents a summary of operating budget and capital expenditure financials, staff, and major components of the school-owned technological infrastructure (mini/mainframes and microcomputers) for the 131 quartile schools. The first two columns present data for the schools as a total aggregate, showing the number of schools and the data for those schools. The columns to the right show the same data for the schools separated by computer dollar per student quartiles (Figure 1). The rows of the table present the data as a total for all of the schools and then as an average per school. For example, 109 of the 131 quartile schools reported computer staff FTE data with a total count of 863 staff members and an average of 7.9 staff FTE per school. Thirty-three schools in the 1st quartile reported a total count of 400 staff FTE, with an average of 12.1 per school in contrast to only 16 schools in the 4th quartile reporting a total of 54 staff FTE, with an average of 3.4 FTE per school.

The 131 schools included in the financial analyses accounted for 93% of the computer operating budgets reported in this survey. Furthermore, these schools accounted for 92% of the total staff FTE, 84% of the total mini/mainframe systems and 91% of the microcomputers. The staff allocations and equipment are presented in further detail in Sections 4 and 5, respectively.

3.2 Operating Budget

The survey requested detailed computer operating budget numbers for seven categories: staff salaries including benefits, equipment maintenance and services, consumables, microcomputer through mainframe software, data acquisition, telephone and line charges, and miscellaneous. Table 3 presents the total budget expenditures for these seven categories for the 131 quartile schools providing data. Total dollar expenditures are listed in the upper third of the table and percents of these total dollar expenditures in the middle third. The lower third presents the data as per school averages.

The first two columns in Table 3 present data for the schools as an aggregate. Two totals are shown, a calculated total and a reported total. The calculated total is the sum of the separate item entries and differs from the reported total when one or more of the schools did not provide item detail data, but rather just the total for the category. Thus, the computer operating budget for the 131 schools shows a calculated total of $36,710,000 and a reported total of $39,384,000. The lower third of the table shows the averages based on both totals, an average of $280,000 per school based on the calculated total, $301,000 based on the reported total.

The columns to the right show the schools separated by computer dollar per student quartiles. For the 33 schools in the 1st quartile, the calculated computer operating budget totaled $22,889,000, $8,424,000 for the 33 schools in the 2nd quartile, $3,936,000 for the 33 schools in the 3rd quartile, and $1,461,000 for the 32 schools in the 4th quartile.

For each total dollar column in the table, the number of schools reporting data is given. Note that the N also varies within each quartile. For example, for staff salaries, all 33 schools in the 1st quartile reported expenditures. However, only 29 of the 33 schools in 2nd and 3rd quartiles, and only 17 of the 32 schools in the 4th, reported expenditures in this category. The "missing" data in this case reflects that these schools did not have their own autonomous business school computing staff, but rather, may rely upon central campus services for support.

The quartile computing operating budget totals follow the general shape seen in Figure 1. The schools in the 1st quartile are spending about 40 times the amount per student as those in the 4th quartile, and show total budgets of about 16 times larger.

The middle third of Table 3 displays the budget categories as percents of the total calculated computer operating budgets, and shows the general distribution of the budget resources. The schools as an aggregate spent 81% of their total computer operating budget on two categories, 52% on staff salaries and 29% on equipment maintenance and services. The other five categories were all 6% or less of the total budget.

Table 3
Total Business School Operating Expenditures by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Staff salaries	108	19199	33	11864	29	4613	29	2127	17	595
Equip. maintenance/services	122	10819	31	7861	32	1882	31	757	28	319
Consumables	116	2136	28	861	31	748	32	367	25	160
Software	122	2004	30	955	31	649	31	207	30	193
Data acquisition	84	1294	26	615	22	342	22	193	14	144
Telephone and line charges	84	902	26	508	23	113	22	258	13	23
Miscellaneous	95	356	28	225	29	77	24	27	14	27
Calculated total		36710		22889		8424		3936		1461
Reported total	131	39384	33	25358	33	8627	33	3936	32	1464
Total dollars (%)		**%**		**%**		**%**		**%**		**%**
Staff salaries		52		52		55		54		41
Equip. maintenance/services		29		34		22		19		22
Consumables		6		4		9		9		11
Software		5		4		8		5		13
Data acquisition		4		3		4		5		10
Telephone and line charges		2		2		1		7		2
Miscellaneous		1		1		1		1		2
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Staff salaries	108	178	33	360	29	159	29	73	17	35
Equip. maintenance/services	122	89	31	254	32	59	31	24	28	11
Consumables	116	18	28	31	31	24	32	11	25	6
Software	122	16	30	32	31	21	31	7	30	6
Data acquisition	84	15	26	24	22	16	22	9	14	10
Telephone and line charges	84	11	26	20	23	5	22	12	13	2
Miscellaneous	95	4	28	8	29	3	24	1	14	2
Average (Calculated total)		280		694		255		119		46
Average (Reported total)	131	301	33	768	33	261	33	119	32	46

For the quartiles, the staff and equipment maintenance categories remained dominant, but with the percentage decreasing from 86% for the 1st quartile to 63% for the 4th. The other five categories also show differences between the quartiles, with the 4th quartile reporting the highest percentages to consumables, software, and data acquisition.

The business school-owned technological infrastructure data presented in Table 2 enables further interpretation of the operating budget categories. For example, the schools in the first three quartiles allocated over 50% of their funds to staff salaries, while the schools in the 4th quartile allocated approximately 40%. This lower allocation may reflect reliance on central campus and student support staff as indicated in Table 2, where it can be seen that only 16 of the 32 schools in the 4th quartile have autonomous business school computer staff. Furthermore, of these 16 schools, only 7 have full-time staff.

The equipment maintenance/service category shows a different pattern of allocations across the quartiles, with a consistent allocation of 19-22% by the 2nd through 4th quartile schools, but an allocation of 34% by the 1st quartile schools. Table 2 allows an explanation of this difference in allocations. The 2nd through 4th quartile schools average about 1.5 mini/mainframes per school and 160-210 microcomputers per school. The 1st quartile schools have more equipment requiring maintenance and service, averaging over 2 mini/mainframes and 260 micros per school.

Table 8 in Section 4.1 presents item details for the staff salary category of the computer operating budget, while Tables 3A through 3F in Appendix 3 present item details separately for the remaining six categories summarized in Table 3.

3.3 Capital Expenditures

The survey requested a capital expenditure total and detail for four separate items: complete microcomputer systems including CPU, monitor, and disks; mini/mainframe systems; communications equipment such as PBX, network bridges, and cabling; and facility rennovation including power, air conditioning, and installation. This data, however, reflects the capital expenditures for the 1989-1990 academic year only, and thus does not even begin to indicate the total cost of the business schools' technological infrastructure summarized in Table 2. For the schools providing the data, Appendix 2 details the total available computer hardware resources on a school by school basis.

One hundred twenty-six (87%) business schools provided capital expenditure data, although only 123 are included in the analysis because of missing computer dollar per student data. Table 4 (in the same format as Table 3) summarizes the capital expenditures by total and then separated by quartile. The 1989-1990 academic year capital expenditures for the 123 schools providing all of the data showed a calculated total of $13,086,000, with an average of $106,000 per school. For the 32 schools in the 1st quartile the capital expenditures totaled $4,923,000, $4,223,000 for the 31 schools in the 2nd quartile, $2,333,000 for the 32 schools in the 3rd quartile, and $1,607,000 for the 28 schools in the 4th quartile.

Table 4 shows, that for the schools as a total aggregate, the largest dollar amount for the 1989-1990 academic year, $8,325,000, went towards the purchase of complete microcomputer systems. Under one quarter of that amount, $2,061,000, was spent on mini/mainframe systems. However, when the capital expenditure is considered by quartile, different capital spending emphases are seen. For instance, the schools in the 1st quartile spent over twice as much on microcomputer systems, as did either the 3rd or the 4th quartiles, whereas the 2nd quartile schools spent the largest amounts on mini/mainframe systems, six schools spending $964,000, and on communications equipment, 24 schools spending $705,000.

The middle third of Table 4 presents the data as percents of the calculated total computer operating budgets and shows the general distribution of the capital expenditure resources. The schools as an aggregate spent 64% of their total computer operating budget on complete

microcomputer systems, and about equal percentages, 16% and 13% on mini/mainframes and communication equipment, and then 8% on facility rennovation.

The quartile distributions again show differences. For example, the significant investment by the 4th quartile schools in microcomputers, 83%, is reflected in Table 2, which shows that their average micros per school, 160, is almost identical to the 3rd, 169. In contrast, none of the schools in the 4th quartile reported spending funds for acquiring or upgrading mini/mainframes whereas the other quartiles spent between 14 and 23 percent. Considering communications expenditures, the 1st quartile schools spent less than half of the other three quartiles. Table 2 explains this lower allocation by showing that the 1st quartile schools have already networked about 76% of their microcomputers. The data suggests that the schools in the other quartiles are striving to achieve this level of connectivity.

Table 4
Total Business School Capital Expenditures by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Microcomputer systems	118	8325	29	3284	30	2199	32	1512	27	1330
Mini/mainframe systems	16	2061	8	705	6	964	2	392	0	0
Communications equipment	73	1640	20	350	24	705	17	356	12	229
Facility rennovation	46	1060	11	584	16	355	12	73	7	48
Calculated total		13086		4923		4223		2333		1607
Reported total	123	13334	32	5121	31	4223	32	2332	28	1658
Total dollars (%)		**%**		**%**		**%**		**%**		**%**
Microcomputer systems		64		67		52		65		83
Mini/mainframe systems		16		14		23		17		0
Communications equipment		13		7		17		15		14
Facility rennovation		8		12		8		3		3
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Microcomputer systems	118	71	29	113	30	73	32	47	27	49
Mini/mainframe systems	16	129	8	88	6	161	2	196	0	0
Communications equipment	73	22	20	18	24	29	17	21	12	19
Facility rennovation	46	23	11	53	16	22	12	6	7	7
Average (Calculated total)		106		154		136		73		57
Average (Reported total)	123	108	32	160	31	136	32	73	28	59

It is also interesting to consider capital expenditures (Table 4) in relation to the computer operating budget (Table 3). For the sample of 131 schools, for the 1989-1990 academic year, the capital budget is about 36% (13,086/36,710) of the operating budget. The quartile data show differences: 22, 50, 59, and 110 percent for the schools in the 1st through 4th quartiles, respectively. These ratios suggest that the schools in the 2nd through 4th quartiles are focusing their available funds toward achieving a basic technological infrastructure, while the first quartile schools are maintaining and upgrading the infrastructure already in place.

3.4 Funding Sources

One hundred eight (75%) schools provided data regarding primary sources of funding to support business school computing. Five distinct fund source categories were identified: the business school or university, the state or government, cash grants and contributions, direct service charges, university reallocation funds, and an additional other source. As in the preceeding tables, Table 5 presents the data for the schools as a total aggregate and separated by computer dollar per student quartiles, and as total dollars, percentages, and averages.

Table 5
Total Sources of Business School Computer-related Income
by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Business school/university	80	18803	21	9417	26	5646	19	2165	14	1575
State/government	27	3533	2	1496	8	751	8	838	9	448
Cash grants/contributions	39	2164	7	496	12	634	12	902	8	132
Direct service charges	42	2595	13	1039	16	963	9	254	4	339
University reallocation funds	35	6322	10	4770	13	890	6	402	6	260
Other	17	3771	7	1224	7	1737	3	810	0	0
Calculated total		37188		18442		10621		5371		2754
Reported total	106	37037	28	18423	30	10490	25	5371	23	2754
Total income sources		**%**		**%**		**%**		**%**		**%**
Business school/university		51		51		53		40		57
State/government		10		8		7		16		16
Cash grants/contributions		6		3		6		17		5
Direct service charges		7		6		9		5		12
University reallocation funds		17		26		8		7		9
Other		10		7		16		15		0
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Business school/university	80	235	21	448	26	217	19	114	14	113
State/government	27	131	2	748	8	94	8	105	9	50
Cash grants/contributions	39	55	7	71	12	53	12	75	8	17
Direct service charges	42	62	13	80	16	60	9	28	4	85
University reallocation funds	35	181	10	477	13	68	6	67	6	43
Other	17	222	7	175	7	248	3	270	0	0
Average (Calculated total)		351		659		354		215		120
Average (Reported total)	106	349	28	658	30	350	25	215	23	120

In Table 5 for the 106 schools providing data, the calculated total source of funding in support of computing was $37,188,000, with the largest amount, $18,803,000, provided by the business schools and/or their universities. With the exception of the university reallocation

funds of $6,322,000, the remaining sources were all about the same. Specific sources in the other category included state lottery funds, special endowments, selling old hardware, contract work, and equipment grants.

Quartile variations are again seen for the sources of computer support funds. The 1st quartile schools by themselves account for almost half, $18,442,000, of the total source of funds, and the total sources by quartile almost double across the quartiles when considered form left to right. The percentages in Table 5 show that all but the 3rd quartile schools derive over half of their income from the business school or university, with the state or government supplementing those funds in the 3rd and 4th quartile schools more than in the 1st or 2nd quartiles. The schools in the 3rd quartile seem particularly capable in achieving cash grants and contributions, whereas those in the 4th quartile appear to be especially focused on using direct service charges as income sources. The 1st quartile schools are greatly assisted by university reallocation funds. The 2nd and 3rd quartile schools are about the same in their "other" sources.

In considering the business schools' reported operating, capital, and sources of funds budgets together, the sum of the reported operating income (Table 3) plus the reported capital expenditures (Table 4) was $52,718,000. On the other hand, the reported total sources of funds was $37,037,000 (Table 5). This suggests that there was a $15,681,000 discrepancy between income and expenditures. One explanation for this discrepancy is in the difference in the number of schools providing expenditure data, 131 operating budget data and 123 capital data, in contrast to only 106 providing sources of funding data. Another factor explaining this difference was the availability of equipment grants, not necessarily included as a source of funds. Forty percent (52) of the 131 schools reported receiving microcomputer donations, almost equally distributed across the quartiles (16, 13, 13, and 10 schools). There were 88 separate donations from eight vendors. Sixteen schools received equipment from two vendors, nine from three vendors and two from four vendors. Apple Computer donated to 35 schools, IBM to 23, Hewlett-Packard to 13, AT&T to eight, and Zenith and Unisys each to four.

3.5 Annual Changes

The final topic in this budget section concerns budget changes. One hundred twenty-six schools (87%) provided information which compared this year's (1989-1990) total computer-related operating budget to last year's (1988-1989) actual and to next year's (1990-1991) expected. Table 6 summarizes these responses.

One hundred twelve schools provided data comparing this year's budget to last year's. For these schools, 41% responded that the budget stayed about the same, within plus or minus four percent. Fifty-one percent responded that this year's budget had increased over last year's: 15% with a moderate increase of between 5 and 9%, 21% with a larger increase from 10 to 19%, and 15% with a significant increase of 50% or greater. In contrast, only 8% of the schools reported actual budget cuts, evenly spread across the percentage categories.

About 44% of the 115 schools comparing this year's budget to next year's expected their budget to remain the same, within plus or minus four percent. About 41% anticipate increases, 37% between 5-19% and 4% greater than 50%. Fifteen percent of the schools, however, are expecting their budgets to decrease, about double those reporting actual decreases from the year before. As this data was collected in the spring of 1990 before the third quarter recession projections and the Iraq invasion of Kuwait, these expectations are probably more optimistic than if the data had been collected at this time (late August 1990).

Table 6
Annual Operating Budget Comparisons
N = 126
(percent of schools)

This year's (1989-90)		Compared to Last year's (1988-89) N=112	Next year's (1990-91) N=115
Same	±4%	41%	44%
Increased	5 - 9%	15	17
	10 - 19	21	20
	50 - 99	7	2
	100 +	8	2
Decreased	5 - 9%	2	3
	10 - 19	2	4
	20 - 49	2	5
	50 - 80	2	3

4. Computing Staff Salaries and Services

The computer support staff at business schools complement the technological infrastructure. One hundred fifteen (79%) of the schools indicated they had their own computing support staff, autonomous from other campus facilities and supported out of the business school computer operating budget. The total number of staff ranged from 0.25 to 50.5 FTE. By category, the staffs ranged from 0.1 to 14.0 for technical, hardware and network staff, from 0.25 to 23.8 FTE for academic user support staff, from 0.1 to 15.3 FTE for administrative support staff, and from 0.1 to 13 FTE for computer facilities management.

Table 7 details the computer staff FTE for the 131 quartile schools. One hundred nine of these schools reported full-time and part-time staff. Almost all the schools in the first three quartiles have their own staff, but only half the schools in the 4th quartile. Furthermore, almost all the 1st quartile schools have full-time staff in all four categories in contrast to the 4th quartile schools. For the part-time staff, the first three quartiles have about the same number of schools reporting part-time FTE in each category. Note that for the 131 schools, when considering the total staff FTE and part-time staff FTE, academic support dominates all quartiles. However, this pattern does not continue for the full-time staff.

Table 7
Business School Computer Staff by Category by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile							
			1st		2nd		3rd		4th	
	N	Count	N	Count	N	Count	N	Count	N	Count
Total staff FTE	109	863	33	400	31	244	29	165	16	54
Technical	83	185	31	88	25	51	20	40	7	6
Academic	91	412	32	188	28	107	23	86	8	31
Administrative	62	102	26	61	18	21	17	19	1	1
Management	92	164	32	63	30	65	21	20	9	16
Fulltime FTE	90	394	32	240	29	97	22	47	7	10
Technical	62	101	30	64	22	28	8	7	2	2
Academic	58	121	28	76	18	25	9	16	3	4
Administrative	46	73	23	51	15	13	8	9	0	0
Management	75	99	30	49	24	31	17	15	4	4
Parttime FTE	96	469	30	160	30	147	24	118	12	44
Technical	54	84	18	24	14	23	16	33	6	4
Academic	76	291	27	112	23	82	20	70	6	27
Administrative	32	29	10	10	9	8	12	10	1	1
Management	42	65	13	14	15	34	8	5	6	12

4.1 Computer Staff Salaries

One hundred eight (75%) schools provided staff salary data, detailed into full-time technical, academic support, administrative support, and management, and part-time/student staff. As shown in Table 8, based on the calculated total, the 108 schools contributing the requisite data paid a total of $17,620,000 in staff salaries, an average of $163,000 per school. The right side of Table 8 is separated into quartiles, based on computer dollar per student as in the previous tables. As before, for each column in the table, the number of schools reporting data is given, with the dollar amount reflecting the total amount reported by those schools. The middle third of the table gives the data as percents and the lower third as per school averages.

For the total aggregate, the amounts spent on the separate staff categories are pretty evenly distributed. Part-time staff show the largest total amount of $4,502,000, followed by academic support and management with $3,834,000 and $3,558,000 respectively, and then by administrative support at $2,890,000, and technical at $2,836,000. The quartile data shows the 1st quartile schools spending the most of any of the other quartiles on all of the staff categories, with the largest single amount on academic support. The quartile staff salary totals more than double across the quartiles from right to left.

The percentages in Table 8 further delineate further the distributions of the computer staff dollar allocations. Both technical and management staff salary categories show about the same percent allocations for the 1st, 2nd, and 3rd quartiles. The highest percent of both

academic and administrative support allocations are shown in the 1st quartile, and the lowest percents in the 3rd. The 4th quartile shows heavy dependence on student staff, 69%.

Table 8
Total Business School Computer Staff Salaries
by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Full-time: technical	64	2836	26	1812	23	680	14	339	1	5
academic support	56	3834	23	2744	19	827	10	192	4	71
admin. support	47	2890	17	2198	17	489	12	170	1	33
management	62	3558	24	1994	21	1077	16	462	1	25
Part-time: students and RAs	90	4502	25	1702	28	1538	25	968	12	294
Calculated total		17620		10450		4611		2131		428
Reported total	108	19199	33	11864	29	4613	29	2128	17	596
Total dollars (%)		**%**		**%**		**%**		**%**		**%**
Full-time: technical		16		17		15		16		1
academic support		22		26		18		9		17
admin. support		16		21		11		8		8
management		20		19		23		22		6
Part-time: students and RAs		26		16		33		45		69
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Full-time: technical	64	44	26	70	23	30	14	24	1	5
academic support	56	68	23	119	19	44	10	19	4	18
admin. support	47	61	17	129	17	29	12	14	1	33
management	62	57	24	83	21	51	16	29	1	25
Part-time: students and RAs	90	50	25	68	28	55	25	39	12	25
Average (Calculated total)		163		317		159		73		25
Average (Reported total)	108	178	33	360	29	159	29	73	17	35

4.2 Staff Allocations and Mean Salary by User Group Served

A major objective of this survey was to delineate the services offered by the computer support staff, and then to show the cost of those services. Ninety-one (63%) of the schools provided the necessary financial, staff, and services data, and accounted for 96% of the salary expenditures indicated in Table 8.

Table 9 presents the mean cost by staff category (columns) as well as the mean cost by user group (rows). The values in this table were calculated by combining three variables: staff FTE allocated by staff category (academic, technical, computer facilities management, and administrative user support), salary information, and the staff allocations to services by user group (undergraduate, MBA, faculty, administrative, and executive education).

Each cell in the Table 9 matrix shows two numbers: the upper number is the mean FTE allocation to that particular cell, the lower, the mean cost of that FTE. For instance, an

average of 0.98 FTE was allocated to academic user support for the faculty, and that support cost an average of $21,584 per school. For the 91 schools providing data, the aggregated total shows an average of 8.16 FTE computer support staff per school at an average cost of $185,866 (about $22,778 per year per staff member). (This average for 91 schools is slightly higher that either of the averages for the 108 schools given at the bottom of Table 8.)

Table 9
Mean Staff Allocations and Salary by User Group Served
N = 91

		Admin. User Support	Technical Hardware, Network	Computer Facilities Mgmt.	Academic User Support	Total Allocation by User Group	Dollar Allocation as % of Total $	Cost Equated to One FTE
Executive program students	FTE	0.03	0.06	0.03	0.13	0.25		
	$	1167	2430	1217	4317	9131	5%	36524
Undergraduate students	FTE	0.08	0.46	0.42	1.48	2.44		
	$	1559	7277	10291	17078	36205	20%	14838
MBA students	FTE	0.03	0.35	0.35	0.97	1.70		
	$	960	7404	10488	19100	37952	20%	22325
Administrative staff/ secretaries	FTE	0.69	0.37	0.28	0.29	1.63		
	$	26307	9166	9347	5126	49946	27%	30642
Faculty	FTE	0.15	0.54	0.47	0.98	2.14		
	$	4076	12691	14281	21584	52632	28%	24594
Total Allocation by Staff Category	FTE	0.98	1.78	1.55	3.85	8.16		
	$	34069	38968	45624	67205	185866		
Dollar Allocation as % of Total $	%	18%	21%	25%	36%		100%	
Salary Equated to One FTE	$	34764	21892	29435	17456			22778

The column totals present the total mean cost by computer staff category. The data indicates that the academic user support staff were allocated the greatest portion of this cost, $67,205 (36%), with management, technical, and administrative following respectively with allocations of $45,624 (25%), $38,968 (21%), and $34,069 (18%) respectively.

Note that the dollar allocation to the academic user support staff category was twice that of the administrative user support staff category, but the actual FTE allocation was four times as great (3.85 vs 0.98). The column totals also show that, for the data provided in this survey, when the average salaries are equated to one FTE, the administrative user support staff member receives the largest annual salary, $34,764, while the academic support staff member, on average, receives the lowest, $17,456. These salary differences may be explained by the fact that schools utilize full-time career personnel to support the administrative functions while relying heavily on part-time student personnel for academic support, as seen in Table 7. The

ratio of full-time to part-time staff for academic support is 1 to 2.5, while the same ratio for administrative support is 1 to 0.4.

The row totals show the mean total cost by user group served. Almost identical allocations, $52,632 (28%) and $49,946 (27%), were shown for staff support to the faculty and the administrative staff user groups, respectively. Similarly, almost identical allocations, $37,952 (20%) and $36,205 (20%), were shown for the MBA and undergraduate student user groups, respectively. Just under 5% ($9,131) of the total computer staff cost was allocated to the executive program user group. Overall, 73% of the resources were allocated to faculty and student support.

The row totals emphasize the differences in average staff costs by user group. The average cost per staff member when equated to one FTE ranges from a low of $14,838 for the undergraduate support staff to $36,524 for the executive program user group. The cost variations suggest that progressively more career personnel are used with the faculty and administrative staff user categories, and that the highest paid staff members work with the executive program students. Note that this last category only accounts for 0.25 FTE.

4.3 Staff Allocations and Mean Salary by Services Provided

This section details the services offered by the computer support staff and delineates the average costs of providing these services. The same 91 schools (63%) provided the necessary financial, staff allocation, and detailed services data for this analysis, as in section above.

Table 10 presents the mean cost by staff category as well as the mean cost by service. The values in this table were calculated by combining three variables: staff FTE allocated by staff category (academic, technical, computer facilities management, and administrative user support), salary information, and the staff allocations to nine services (data acquisition, video equipment, training, documentation, mini/mainframe, network, programming, microcomputer, and consulting).[3]

Table 10 retains the column staff category data of Table 9 but changes the row data to show the allocation of those same staff salaries by services provided. (The column totals in Tables 9 and 10 differ due to rounding.) As before, each matrix cell of Table 10 shows two numbers: the upper number is the mean FTE allocation to that particular cell, the lower the mean cost of that FTE. For instance, for the 91 schools providing data, an average of 1.41 FTE was allocated to academic user support for consulting to individual users at an average cost of $21,534.

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[3] The service category definitions provided in the questionnaire were:
- Data acquisition services: on-line databases, CD-ROM, ABI Inform, etc.
- Video equipment, computer display capability: delivery to classrooms, maintenance, repair, purchase recommendations, etc.
- Training (to groups of users): introduction to computing, word processing, spreadsheet, statistics, etc.
- Support services: preparation of documentation, training materials, handouts, newsletters, software library, etc.
- Mini/mainframe support services: trouble shooting, daily operations, backup, maintenance, repair, software installation, system programming, etc.
- Network support services: maintenance, trouble shooting, installation, software, cabling, etc.
- Programming: curriculum, research, administrative applications, database administration, etc.
- Microcomputer support services: hardware trouble shooting, inventory management, installation, maintenance, repair, etc.
- Consulting (to individual user): word processing, spreadsheet, statistics, graphics, hardware and software purchase recommendations, etc.

The row totals in Table 10 divide the total staff costs by services provided. The largest staff cost allocations were to consulting and microcomputer support services which accounted for 21% and 19%, respectively, followed by programming with 15%. Almost identical percentage allocations were shown for network (11%), mini/mainframe (10%), training (9%), and documentation (9%). Staff salary as a percentage allocated to video equipment and data acquisition services were both 3%.

Table 10
Mean Staff Allocations and Salary by Services Provided
N = 91

		Admin. User Support	Technical Hardware, Network	Computer Facilities Mgmt.	Academic User Support	Total Allocatio by Service	Dollar Allocation as % of Total $	Service Cost Equated to One FTE
Data acquisition services	FTE	0.01	0.02	0.03	0.12	0.18		
	$	729	561	1333	3037	5660	3%	31444
Video equipment, computer display	FTE	0.02	0.09	0.07	0.12	0.30		
	$	252	1841	2143	1795	6031	3%	20103
Training (to groups of users)	FTE	0.08	0.05	0.10	0.69	0.92		
	$	2566	887	3583	9919	16955	9%	18429
Documentation Support Services	FTE	0.09	0.09	0.22	0.31	0.71		
	$	2975	2445	5644	6200	17264	9%	24315
Mini/mainframe Support Services	FTE	0.06	0.21	0.21	0.17	0.65		
	$	2174	5363	7788	2547	17872	10%	27495
Network Support Services	FTE	0.08	0.42	0.17	0.23	0.90		
	$	1654	9990	5316	3572	20532	11%	22813
Programming	FTE	0.29	0.11	0.08	0.33	0.81		
	$	13643	1959	2874	9010	27486	15%	33933
Microcomputer Support Services	FTE	0.14	0.55	0.30	0.57	1.56		
	$	5108	11610	7948	10026	34692	19%	22238
Consulting (to individual user)	FTE	0.20	0.23	0.23	1.41	2.07		
	$	5350	4258	7530	21534	38672	21%	18682
Total Allocations by Staff Category	FTE	0.97	1.77	1.41	3.95	8.10		
	$	34451	38914	44159	67640	185164		
Dollar Allocation as % of Total $	%	19%	21%	24%	37%		100%	
Salary Equated to One FTE	$	35516	21985	31318	17124			22860

In terms of FTE, these allocations followed the order of the dollar allocations except for training and programming which is due to the very different costs related to the provisions of those services. As shown in Table 10 (when salary was equated to one FTE), administrative user support was the most expensive computer staff salary category, $35,516. Table 10 displays where these administrative user support costs are incurred. Specifically, 40% of the average cost for administrative support is generated by 0.29 FTE programming related activities by the highest salaried service category. In contrast, consulting to individual users accounted for 32% of the funds supporting academic users, and was provided by 1.41 FTE of the lowest salaried staff category, once again reflecting the extensive use of part-time students.

The technical staff allocation of 30% (0.55 FTE) to microcomputers in contrast to 14% (0.21 FTE) to mini/mainframes documents the business schools' emphasis on microcomputers. Network support services (not differentiated between microcomputer and mini/mainframe in the questionnaire) accounts for a further 26% (0.23 FTE) of the technical staff's allocation.

The allocation data for the computer facilities management staff show the broadest spread in allocations across the service categories.

5. Hardware

Even though the primary focus of this Seventh Survey was on computer-related services and costs, the schools were asked to update (or provide) the computer hardware information as carried in the annual survey databases. This section briefly presents the hardware data as provided by the schools, in the table and figure formats as presented in the previous surveys.

5.1 Mini/mainframes

Table 1 shows that 95% (138) of the business schools indicated that their users had access to mini/mainframe systems, with 37% (54) schools maintaining their own systems. Appendix 2 provides detailed information on the make and models of the mini/mainframes available as reported by each school.

The 54 business schools which maintained their own mini/mainframe systems listed 100 separate computers, displayed by make, model and number of the systems in Table 11. Although 16 different vendors were represented, only six had at least three systems installed in the schools reporting data. Digital Equipment Corporation had the largest number of systems installed, with 34 (34%) of the total 100. The VAX 11/7xx series continues to be the most installed system (15), followed closely by the IBM 4300s (12), and the AT&T 3Bxs (10).

Data provided by 23 of these schools maintaining their own mini/mainframes indicated their pattern of usage, as shown in Table 12. Twenty-seven systems were used only for a single purpose, either for coursework (10 systems), for research (9 systems), or for administrative activities (8 systems). Twenty-three other systems were shared in all of these usage categories. Four each were shared just between coursework and administration and between research and administration.

Twenty-three schools indicated they had plans for acquiring a new mini/mainframe system, usually within a one year time frame.

Table 11
Business School Mini/Mainframe Systems Installed by Model
(number of systems)

Make (at least three systems)	1990 N=54	1989 N=61	1988 N=70	1987 N=46	1985 N=39	1984 N=33
AT&T						
3Bx	10	15	14	3		
Data General						
MV xxx	4	3	4	2		
Digital						
VAX 11/7xx	15	18	23	17	10	7
VAX 6xxx	5					
VAX 8xxx	7	8	7	4		
MicroVAX	7	16	11	5		
Hewlett Packard						
HP3000s	5	12	12	11	8	6
IBM						
43xx	12	17	16	13	9	2
S36,38	6	7	6	3	1	
9370	3					
PRIME						
7xx, 8xx, 9xxx	3	3	5	3	4	2
Others (1 or 2 each)	23	23	29	19	27	20
Total	**100**	**122**	**127**	**80**	**59**	**37**

Table 12
Business School Mini/Mainframe Systems Usage Patterns
N=23 Business Schools
(using 77 mini/mainframes)

Usage	Categories	Course		Research		Administration
10	used only for	x				
9	used only for			x		
8	used only for					x
23	used for all	x	and	x	and	x
19	used for	x	and	x		
4	used for	x			and	x
4	used for			x	and	x

5.2 Microcomputers

One hundred forty-three (99%) of the business schools provided data on their microcomputers. There was a total of 28,758 microcomputers at these business schools, ranging from 23 to 794 per school, with an average of 201 systems per school. Appendix 2 presents the microcomputer data detailed by school.

Table 13 displays the percentage of business schools which report owning four or more of the same microcomputer systems. In total, at least 31 different microcomputer manufacturers were represented, along with over 40 different microcomputer models. Eighty-five percent of the schools reported having four or more IBM PCs or PC/XTs, 58% IBM PS/2s, 48% Macintosh Plus/SEs, 39% XT clones, 33% IBM PC/ATs, 32% Zenith 286/386 and 32% 286 clones, and 30% Macintosh IIs. All of the other models were reported by less than 30% of the schools.

Comparison of the data across the past six years (Table 13) shows that the ranking of the models by percentage in schools has remained almost the same for the top models, and that in general these models are found in moderately higher percentages of the schools. A trend over the years has been for schools to continue to add models. Several models (e.g., HP150 and Tandy) were not reported by schools this year and will be aggregrated into the other category next year.

Table 13
Microcomputer Systems at Business Schools
(percent of schools with systems)

Model (at least 4 systems)	1990 N=143	1989 N=161	1988 N=175	1987 N=128	1985 N=119
IBM PC, PC/XT	85%	86%	86%	86%	82%
IBM PS/2	58	49	31		
Macintosh Plus/SE	48	35	29	26	13
XT Clones	39	35			
IBM PC/AT	33	34	35	35	5
Zenith 286/386	32	29	42	30	10
286 Clones	32	17			
Macintosh II	30	17			
Zenith 150	27				
386 Clones	23	8			
HP Vectra 286	13	13	11	9	3
AT&T 286	8	12	14	6	0
HP Vectra 386	8	7			
Unisys	7	6	7	8	4
AT&T 386	6	3			
AT&T 6300	6				
DEC Rainbow	4	6	6	6	13
Apple II series	4	5	7	10	16
Leading Edge	4	4			
NCR	3	2			
HP 150s		6	7	10	4
Tandy		2	4	2	10
Other	21	33	35	31	19

Dispersion of microcomputer models is continuing, contributing to a wider diversity of systems, both in make and model generations, at the business schools. Table 14 documents this increase in diversity. For example, in 1987 just over 50% of the schools were supporting one or two different microcomputer models. In contrast, in 1990 no business school reported having just one model and 4% reported having only two. Over 50% of the schools in this year's survey reported supporting 7 or more different models.

Table 14
Different Microcomputer Models Supported by School
N = 143

Number of different microcomputer models	N=143 1990	N=161 1989	N=128 1987
1	-	1%	17%
2	4%	6	35
3	9	11	24
4	8	15	12
5	10	18	7
6	15	14	3
7	14	10	
8	12	7	
9	12	8	
10	7	5	1
11-14	6	4	
15-18	1		

Table 15 details the 28,758 microcomputers by model where at least 300 systems were reported. Although this is the first year the absolute number of microcomputers has declined, the average number of microcomputer systems per school still increased by about 5%, from 191 in the 1989 to 201 in the 1990 data. Yet, compared to the earlier rate of increases of 63% between 1985 and 1987, 18% between 1987 and 1988, and 23% between 1989 and 1988, this 5% increase in average systems per school is significantly slower. The reader is again reminded that the business schools comprising the samples are not the same from year to year.

The top nine models in Table 15 account for 82% of the total 28,758 microcomputers. Table 16 reports the distribution of these nine models among the faculty, student, administrative, and computer staff user groups. As all schools did not provide user group data, the number of systems are slightly different from Table 15. Eighty percent of the systems are about evenly divided between faculty and students.

Table 15
Microcomputer Systems by Model
(number of systems)

Model (>300 Systems)	1990 N=143		1989 N=161		1988 N=175		1987 N=128		1985 N=119	
	Count	%	Count	%	Count	%	Count	%	Count	%
IBM PCPC/XT	7204	25	9286	30	10149	37	7509	45	5120	54
IBM PS/2	3678	13	2393	8	1305	5				
XT Clones	2666	9	2714	9						
Macintosh Plus/SE	2456	9	2165	7	1893	7	925	5	457	5
Zenith 286/386	2037	7								
286 Clones	1597	6	1055	3						
IBM PC/AT	1506	5	1827	6	2110	8	1194	7	259	3
Zenith 8088	1276	4	3923	13	3274	12	1791	11	411	4
Macintosh II	1011	4	444	2						
Unisys	848	3	881	3	765	3	593	4	544	6
HP Vectra 286	715	3	1194	4	538	2	349	2	40	0
386 Clones	615	2								
AT&T 286	489	2	1043	3	1172	4				
Leading Edge	324	1	403	1						
HP Vectra 386	315	1	632	2						
Others	2021	6	2780	9	6004	22	4364	26	2725	28
Total	28758	100%	30740	100%	27210	100%	16725	100%	9556	100%
Average systems per school	201		191		155		131		80	

Table 16
Microcomputer Distribution by User Groups
(9 major models)

Model	Number Schools	Total Systems	Percent Student	Faculty	Admin	Computer Staff
IBM PC/XT	125	7204	39%	40%	20%	1%
IBM PS/2	97	3678	44	37	12	7
XT Clones	69	2666	47	37	16	0
Macintosh Plus/SE	90	2432	40	37	19	4
Zenith 286/386	48	1949	47	39	14	0
286 Clones	63	1597	35	41	21	3
IBM PC/AT	78	1506	27	41	28	4
Zenith 8088	45	1276	44	42	13	1
Macintosh II	76	989	51	33	8	8
Average			41	39	17	3

The business schools were asked to estimate the percent of their undergraduate and MBA students who own microcomputers, Table 17. The 111 schools providing data for undergraduates estimated an average of 22.8% student owner their own microcomputers, and for the 116 schools providing MBAs estimates, the average was 39.7%.

Table 17
Estimated Student Microcomputer Ownership
(percent of schools)

Student Ownership	Undergraduates N=111	MBA N=116
Less than 1/3	83	46
1/3 to 2/3	15	38
More than 2/3	2	16
Average	22.8	39.7
Range	5 - 100%	2 - 100%

5.3 Technological Innovations

This year's survey once again presented the respondents an opportunity for the business schools to share information on innovative and exciting uses of technology: "Does your business school have any projects, labs, or other features which you would care to share?" Thirty-nine schools (27%) provided descriptions describing projects at their schools. Appendix 4 provides a short description of each project, together with a contact name and phone number for those wanting additional information. The majority of the 39 schools presented information on their progress in building an integrated technological infrastructure and networking developments.

SEVENTH ANNUAL UCLA SURVEY: 1990
GENERAL SCHOOL DATA

INSTITUTION	TYPE	UGRAD (FTE)	MBA (FTE)	PHD (FTE)	FAC (FTE)	COMP OP BUDGET	COMP BDGT/ STUDENT($)	COMP/TOT BUDGET(%)	STUD/COMP STAFF	COMPUTER FEE
U OF ALABAMA	PUB	4386	166	128	93	223615	48	2.7	260	
U OF ALASKA	PUB	600	90	.	36	151000	219	5.0	230	YES
ALFRED U	PRIV	370	.	.	21	89500	242	8.9	370	
ARIZONA ST U	PUB	8850	794	145	190	220000	22	.	3916	
U OF ARKANSAS	PUB	3222	171	74	104	42900	12	.	6934	
BABSON COL	PRIV	1584	689	.	125	922500	406	1.9	84	
BALL STATE U	PUB	4050	169	.	109	49666	12	0.8	.	
BAYLOR U	PRIV	3076	163	.	127	399000	123	3.2	360	YES
BOISE ST U	PUB	2947	222	.	69	.	.	.	792	
BOSTON COL	PRIV	550	105	.	83	.	.	.	.	
BOSTON U	PRIV	1800	833	33	158	280535	105	2.8	444	YES
BRADLEY U	PRIV	822	152	.	48	18400	19	.	3896	
BRIGHAM YOUNG U	PRIV	4000	600	.	115	206500	45	.	657	
U OF CAL, BERKELEY	PUB	530	457	93	76	1090305	1010	8.7	144	YES
U OF CAL, IRVINE	PUB	.	263	40	50	329800	1088	4.1	40	YES
U OF CAL, L A (ANDERSON)	PUB	.	900	150	106	1142000	1088	7.8	61	YES
CAL ST U, BAKERSFIELD	PUB	440	109	.	37	4214	8	.	.	
CAL POLY ST U, SLO	PUB	1900	150	.	65	135000	66	.	820	YES
CAL ST U, SACRAMENTO	PUB	5010	569	.	167	143293	26	1.5	1014	
CAL ST U, FULLERTON	PUB	7144	597	.	168	211800	27	.	968	
CAL ST U, HAYWARD	PUB	3757	619	.	106	180389	41	.	486	
CAL ST U, LONG BEACH	PUB	4392	235	.	101	388069	84	6.0	712	YES
CAL ST U, FRESNO	PUB	3530	340	.	111	53062	14	0.8	387	
CANISIUS COLLEGE	PRIV	1391	208	.	58	22710	14	.	.	
CARNEGIE MELLON U	PRIV	339	513	73	99	519100	561	3.5	93	
CASE WESTERN U (WEATHERHEAD)	PRIV	170	763	95	61	448901	437	3.2	108	

U OF CENTRAL FLORIDA	PUB	3900	725	24	106	84500	18	9.4	.	
CENTRAL MICHIGAN U	PUB	3435	284	.	102	151167	41	.	372	YES
CHARLESTON COL	PUB	800	.	.	30	23100	29	1.9	.	
U OF CHICAGO GSB	PRIV	.	1600	80	135	.	.	.	65	
U OF CINCINNATI	PUB	2450	227	64	95	204000	74	.	305	
CLEVELAND ST U	PUB	1600	530	40	120	177500	82	2.4	543	
U OF COLORADO, BOULDER	PUB	2430	416	77	80	180428	62	3.3	254	
COLUMBIA U	PRIV	.	1430	100	150	827577	541	.	102	
U OF CONNECTICUT	PUB	1086	1460	38	80	128391	50	1.5	517	
CORNELL U (JOHNSON)	PRIV	.	454	27	44	549000	1141	4.6	32	
DARTMOUTH COLLEGE (TUCK)	PRIV	.	330	.	35	232000	703	2.1	44	
DUKE U (FUQUA)	PRIV	.	758	28	78	.	.	.	60	
EAST CAROLINA U	PUB	822	236	.	66	80100	76	.	132	
EAST TEXAS ST U	PUB	847	139	.	30	35690	36	2.4	657	YES
EMORY U	PRIV	260	255	.	43	359000	697	5.4	86	
U OF FLORIDA	PUB	2321	176	255	110	293400	107	2.8	250	
FLORIDA INTERNATIONAL U	PUB	1609	336	46	104	50100	25	5.2	1138	
FORT LEWIS COLLEGE	PUB	3983	.	.	28	.	.	.	.	
GEORGETOWN U	PRIV	1110	240	.	65	234300	174	.	104	YES
U OF GEORGIA	PUB	5200	132	129	130	365314	67	.	303	YES
GEORGIA SOUTHERN U	PUB	2750	150	.	72	23500	8	.	967	
HARVARD U	PRIV	.	1596	111	206	5500000	3222	4.4	34	
U OF HAWAII	PUB	1122	218	6	116	545000	405	7.7	96	YES
U OF HOUSTON	PUB	3300	1300	100	89	263450	56	.	588	YES
U OF ILLINOIS, URBANA-CHAMPAIGN	PUB	3500	576	231	173	715000	166	6.0	131	
INDIANA-PURDUE U, FORT WAYNE	PUB	283	171	.	37	52525	116	2.6	252	
INDIANA U (SOUTHBEND)	PUB	450	100	.	38	30100	55	1.5	.	
JAMES MADISON U	PUB	3171	162	.	102	182800	55	.	3333	
JOHN CARROL U	PRIV	.	.	.	42	220650	.	6.7	.	
U OF KANSAS	PUB	937	455	35	60	75600	53	.	951	

KANSAS ST U	PUB	3000	160	.	52	69083	22	1.8	1580	
KENT ST U	PUB	3116	383	142	98	161579	44	2.0	602	
LAMAR U	PUB	1500	100	.	40	21000	13	0.8	.	
U OF LOUISVILLE	PUB	1447	376	.	104	60981	33	1.0	.	
LOYOLA COLLEGE	PRIV	1074	395	.	65	.	.	.	.	
LOYOLA MARYMOUNT U (LA)	PRIV	1248	324	.	43	55100	35	.	1572	
LOYOLA U, CHICAGO	PRIV	1319	350	.	85	10000	6	.	.	
LOYOLA U, NEW ORLEANS	PRIV	1025	295	.	42	.	.	.	660	
U OF MAINE	PUB	1048	92	.	26	38450	34	2.2	4560	YES
MARQUETTE U	PRIV	1974	536	.	84	68000	27	.	228	
U OF MARYLAND	PUB	1800	700	100	105	335400	129	4.8	289	
MIT (SLOAN)	PRIV	200	450	100	81	597350	796	.	88	YES
MEMPHIS ST U	PUB	2801	392	73	143	57500	18	0.7	.	
MIAMI U (OHIO)	PUB	4452	163	.	167	136100	29	.	769	
U OF MICHIGAN	PUB	621	1781	102	149	975585	390	2.3	91	
U OF MINNESOTA	PUB	1386	2268	153	112	138000	36	.	761	
MISSISSIPPI ST U	PUB	2898	114	60	84	67000	22	1.7	439	
U OF MISSOURI, ST LOUIS	PUB	2400	240	.	60	80000	30	2.7	10560	
MONTANA ST U	PUB	1440	10	.	28	5100	4	0.4	.	
U OF NEW MEXICO (ANDERSON)	PUB	950	323	.	62	117242	92	3.4	318	YES
U OF NEW ORLEANS	PUB	3786	453	33	88	73396	17	1.6	4272	
NEW YORK U	PRIV	2816	1721	97	251	2632100	568	5.1	101	YES
NICHOLLS ST U	PUB	800	98	.	47	160700	179	4.0	599	
U OF NORTH DAKOTA	PUB	1500	70	.	65	60500	39	2.6	.	
U OF NORTH FLORIDA	PUB	1500	200	.	55	.	.	.	.	
U OF NORTH TEXAS	PUB	6122	741	187	138	497250	71	7.2	1175	YES
NORTHERN ARIZONA U	PUB	900	54	.	69	88800	93	.	.	YES
NORTHERN ILLINOIS U	PUB	6000	895	43	120	66800	10	0.9	.	YES
OAKLAND U, MICHIGAN	PUB	1321	155	.	52	140938	95	3.5	422	YES
OHIO ST U	PUB	3050	707	150	143	1543090	395	.	193	YES

U OF OREGON	PUB	2120	180	48	60	163700	70	4.3	335	YES
OREGON STATE U	PUB	2654	180	.	62	164344	58	4.0	436	
U OF THE PACIFIC	PRIV	511	.	.	26	7655	15	9.0	341	YES
PACIFIC LUTHERAN U	PRIV	525	127	.	27	8000	12	.	.	
PAN AMERICAN U	PUB	2700	70	.	44	5800	2	0.3	.	
PURDUE U (KRANNERT)	PUB	2391	317	120	104	551600	195	5.3	269	
U OF ROCHESTER (SIMON)	PRIV	171	648	58	58	518000	591	4.1	84	YES
ROLLINS COLLEGE (CRUMMER)	PRIV	.	220	.	18	229000	1041	8.8	110	
RUTGERS U	PUB	700	460	.	80	20500	18	.	.	
SANTA CLARA U	PRIV	1015	1081	.	94	34257	16	.	.	
SEATTLE U	PRIV	440	290	.	45	44000	60	1.9	1460	
U OF SOUTH ALABAMA	PUB	.	.	.	51	15000	.	.	.	
U OF SOUTH CAROLINA	PUB	2850	977	123	145	.	.	.	146	
U OF SOUTH DAKOTA	PUB	592	155	.	36	66272	89	4.4	.	YES
U SOUTHERN CALIF	PRIV	3390	1350	63	195	1375700	286	.	274	
SOUTHERN ILLINOIS U, CARBONDALE	PUB	2329	131	52	59	61690	25	1.4	3349	
SOUTHERN ILLINOIS U, EDWARDSVILLE	PUB	1225	695	.	79	126500	66	3.6	120	YES
SOUTHERN METHODIST U	PRIV	775	610	.	63	313200	226	.	277	YES
U OF SOUTHERN MISSISSIPPI	PUB	2134	107	.	77	17650	8	0.4	560	
STATE U NEW YORK, BUFFALO	PUB	1136	956	97	79	94000	43	0.8	365	
SUFFOLK U	PRIV	936	450	.	63	192500	139	2.1	504	YES
SYRACUSE U	PRIV	1766	466	54	85	27706	12	11.0	2286	
TENNESSEE TECH U	PUB	1450	150	.	39	51442	32	1.8	2133	YES
U OF TEXAS, ARLINGTON	PUB	5389	888	87	137	85900	13	1.2	636	YES
TEXAS A&M U	PUB	6400	600	100	153	25138	4	.	7100	
TEXAS TECH U	PUB	4385	450	76	98	225100	46	4.5	702	
TULANE U	PRIV	352	351	.	52	286302	407	2.2	187	
U OF UTAH	PUB	850	250	50	60	225480	196	4.5	77	
UTAH STATE U	PUB	1680	193	.	50	178500	95	7.4	375	YES
VANDERBILT U (OWEN)	PRIV	.	360	15	44	335000	893	.	188	

U OF VERMONT	PUB	810	30	.	30	51950	62	.	1120	
U OF VIRGINIA (DARDEN)	PUB	.	471	5	60	428450	900	2.6	53	
U OF VIRGINIA (MCINTIRE)	PUB	666	79	.	65	224000	301	4.5	35	
VIRGINIA COMMONWEALTH U	PUB	.	.	.	.	.	.	.	.	
VIRGINIA TECH (PAMPLIN)	PUB	3236	298	99	133	891000	245	9.6	2422	
WAKE FOREST U (BABCOCK)	PRIV	.	320	.	26	126800	396	2.6	160	YES
U OF WASHINGTON	PUB	1441	500	99	90	.	.	.	240	
WASHINGTON U (OLIN)	PRIV	562	594	30	53	435000	367	3.6	119	YES
WASHINGTON AND LEE U	PRIV	80	.	.	11	51900	649	3.5	40	
WAYNE STATE U	PUB	1424	2060	.	80	179160	51	2.0	218	YES
WESTERN CAROLINA U	PUB	1063	115	.	45	137000	116	4.7	589	
WESTERN ILLINOIS U	PUB	1807	242	.	77	40250	20	0.9	.	
WINTHROP COLLEGE	PUB	1250	240	.	56	297711	200	7.6	88	YES
U OF WISCONSIN, LA CROSSE	PUB	2107	64	.	56	.	.	.	.	
U OF WISCONSIN, MADISON	PUB	1136	654	81	100	366800	196	4.3	178	YES
U WISCONSIN, OSHKOSH	PUB	2450	500	.	44	97200	33	2.6	3933	YES
U OF WISCONSIN, WHITEWATER	PUB	4379	320	.	93	26000	6	0.5	.	YES
WRIGHT STATE U	PUB	1782	585	.	79	282700	119	4.2	1091	
U OF WYOMING	PUB	1275	61	27	62	20691	15	0.6	.	
YALE U	PRIV	.	430	50	84	389450	811	.	69	YES
U OF ALBERTA	PUB	1660	189	40	114	540145	286	.	472	
U BRITISH COLUMBIA	PUB	1500	400	70	93	154167	78	1.9	657	
U OF CALGARY	PUB	1000	350	2	87	424000	314	6.1	386	
UNIVERSITE LAVAL	PUB	3166	308	35	.	700700	200	.	351	
MCGILL U	PRIV	1700	450	35	95	219455	100	3.6	312	
MCMASTER U	PUB	1546	366	14	60	75410	39	1.4	1926	
QUEEN'S U, KINGSTON	PUB	750	205	35	50	73000	74	1.8	495	
U TORONTO	PUB	1500	560	50	70	336000	159	5.2	603	
U WESTERN ONTARIO	PUB	320	520	30	83	487000	560	.	109	YES

SEVENTH ANNUAL UCLA SURVEY: 1990
HARDWARE RESOURCES

INSTITUTION	MAINFRAME MODEL(S), YR(S)	#	MICROCOMPUTERS (N>3)	TOTAL MICROS	STUDS/ MICRO	FAC/ MICRO
	* B-SCHOOL ACCESS ONLY					
U OF ALABAMA		179	IBM PC, PCXT	275	46	1
		4	IBM PS/2			
		14	PC, XT CLONES			
		27	PC 286 CLONES			
		19	PC 386 CLONES			
		26	UNISYS			
		4	ZENITH 150 & ABOVE			
U OF ALASKA	* IBM 4341 (89)	14	APPLE MACINTOSH	112	12	0.9
	* UNISYS (88) A4 MAINFRAME	10	APPLE MACINTOSH II			
	VAX (80)	36	IBM PC, PCXT			
	* UNISYS U5000 (89)	14	IBM PS/2			
		16	PC 286 CLONES			
		18	UNISYS			
ALFRED U		7	IBM PC, PCXT	70	8	1.1
		20	PC, XT CLONES			
		43	PC 386 CLONES			
ARIZONA ST U	IBM 3090 1	24	APPLE MACINTOSH	423	61	0.8
	DEC VAX 8600	20	APPLE MACINTOSH II			
	CRAY X-MP	10	HP VECTRA 286			
	IBM 3081-K	10	HP VECTRA 386			
		230	IBM PC, PCXT			
		50	IBM PC/AT			
		7	IBM PS/2			
		5	PC 286 CLONES			
		67	ZENITH			
U OF ARKANSAS	IBM 4381 R-14	20	IBM PC, PCXT	193	23	2.8
	* PRIME 9750	40	IBM PC/AT			
		52	IBM PS/2			
		15	PC, XT CLONES			
		64	ZENITH 150 & ABOVE			
BABSON COL	DEC VAX 11/780 (80)	20	APPLE MACINTOSH	464	17	1.3
	DEC VAX 11/785 (84)	65	DEC RAINBOW			
		200	IBM PC, PCXT			
		7	IBM PS/2			
		165	PC 286 CLONES			
		6	PC 386 CLONES			
BALL STATE U	IBM 370.3083	6	APPLE II SERIES	318	24	1
	DEC VAX 11/780, 4	14	APPLE MACINTOSH			
	DEC VAX 11/8650	8	APPLE MACINTOSH II			
	* DEC MICROVAX II (87)	56	AT & T 286			
		34	IBM PC, PCXT			
		86	IBM PS/2			
		102	ZENITH 150 & ABOVE			
		6	COMPAQ			
		5	CPT W/DOS			

BAYLOR U	IBM 4361-L5 (86) * IBM 4381-P22 (88) * IBM 5362-P MINI (87)	24 4 166 98	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT IBM PS/2	295	21	1.2
BOISE ST U	IBM 4341 (81) HP 3000 (77)	20 70 46 6 5 7	HP 150 IBM PC, PCXT IBM PS/2 PC 286 CLONES ZENITH ZENITH 150 & ABOVE	166	47	0.9
BOSTON COL	IBM 3090 (85) VAX CLUSTER, 4 (81,86)	365 176 115	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT	656	4	0.2
BOSTON U	* ENCORE MULTIMAX 120 * SANYO ICON 4000 IBM 3090 IBM 3090	91 32 169	APPLE MACINTOSH IBM PC, PCXT IBM PS/2	295	25	1.3
BRADLEY U	CDC 930 (89) VAX 780	6 5 85	AT & T 386 IBM PC, PCXT 6300	101	20	1.1
BRIGHAM YOUNG U	VAX 8600 (88)	35 5 11 200 5 22	APPLE MACINTOSH APPLE MACINTOSH II AT & T 286 IBM PC, PCXT IBM PC/AT IBM PS/2	278	29	1.3
U OF CAL, BERKELEY	IBM 7090 DEC VAX 8600	23 24 33 75 22	APPLE MACINTOSH HP VECTRA 286 IBM PC, PCXT IBM PC/AT IBM PS/2	179	10	1.7
U OF CAL, IRVINE	* HP 3000 MICRO XE DEC VMS 11/780 AND 785 DEC VMS 8350 BALANCE SEQUENT 21000 IBM 9375	26 76 42 11	APPLE MACINTOSH II HP VECTRA 286 HP VECTRA 386 IBM PC, PCXT	161	3	1.3
U OF CAL, L A (ANDERSON)	IBM 3090 (85) * HP 9000/850 (88)	55 104 18 29 146 7	APPLE MACINTOSH HP VECTRA 286 HP VECTRA 386 IBM PC, PCXT IBM PC/AT IBM PS/2	359	7	0.7

CAL ST U, BAKERSFIELD	VAX 8250 CYBER 180830 (80)	32	ZENITH	35	0	1.1
CAL POLY ST U, SLO	IBM 4300 IBM 3090 * HP 3000	4 6 70 27 9 13 22	APPLE MACINTOSH HP 150 HP VECTRA 286 HP VECTRA 386 IBM PC, PCXT PC, XT CLONES BRAND NOT GIVEN	152	31	1.1
CAL ST U, SACRAMENTO	VAX-198 * IBM 9370 (88)	30 95 135 5	IBM PC, PCXT PC, XT CLONES PC 286 CLONES PC 386 CLONES	268	86	1
CAL ST U, FULLERTON	PRIME 9755 (86) DEC VAX 8550	50 5 58 25 141 20 4	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT IBM PS/2 PC, XT CLONES PC 286 CLONES ZENITH 150 & ABOVE	307	48	1.4
CAL ST U, HAYWARD	CDC CYBER 9060 AT&T 3B2-400, 9 PRIME 9755 (86) * AT&T 3B2-400 IBM 9370/90	67 16 52	AT & T 286 AT & T 386 IBM PC, PCXT	140	89	1.7
CAL ST U, LONG BEACH	* IBM 9370 (88) DEC 5810 (90) VAX 6320 (89) PRIME 9955 (87) PRIME 9755 (87)	10 136 90	APPLE MACINTOSH IBM PC, PCXT IBM PS/2	240	34	1.4
CAL ST U, FRESNO	DEC VAX 11/785 (87) PRIME 9755 (86) CDC CYBER 830 (86) IBM 4381 (89) IBM 9370 (90)	238 75 7	IBM PS/2 PC, XT CLONES UNISYS	324	21	0.9
CANISIUS COLLEGE	DEC VAX 8650 (87) DEC VAX 750 (82)	5 6 23 34 7 22	APPLE MACINTOSH II HP VECTRA 286 HP VECTRA 386 IBM PC, PCXT IBM PS/2 ZENITH 150 & ABOVE	99	31	1.7
CARNEGIE MELLON U	IBM 3083 (84) VAX 6420	23 50 153 5 47 5 10	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT IBM PC/AT IBM PS/2 PC 386 CLONES ZENITH	297	10	1

CASE WESTERN U (WEATHERHEAD)	DEC 2060 IBM 4381 (87)	9 APPLE MACINTOSH 15 APPLE MACINTOSH II 15 IBM PC, PCXT 5 PC, XT CLONES 176 PC 286 CLONES	226	14	0.9
U OF CENTRAL FLORIDA	IBM 4381 IBM SYSTEM 38	150 IBM PC, PCXT 20 IBM PS/2	179	93	1.1
CENTRAL MICHIGAN U	IBM 3090 * IBM 36 (MINI)	8 AT & T 286 124 IBM PC, PCXT 8 IBM PS/2 18 ZENITH 18 EPSON	176	41	1.9
CHARLESTON COL	WANG VS100 (84) DEC VAX (89)	12 IBM PC, PCXT 51 PC, XT CLONES	66	22	1
U OF CHICAGO GSB	* VAX 8650 (86) * VAX 6430 (90) * DEC-20 (77) * SUN 330 (89) * MICROVAX II (86)	35 APPLE MACINTOSH 27 APPLE MACINTOSH II 63 HP VECTRA 286 4 IBM PC, PCXT 6 IBM PC/AT 7 IBM PS/2 95 PC, XT CLONES 37 PC 286 CLONES 15 PC 386 CLONES 19 ZENITH 150 & ABOVE 5 MAC CX	317	22	1.5
U OF CINCINNATI	AMDAHL 5580,470 (80,84) VAX 785 (85) VAX 750 (87) * AT&T 3B2 (87) * MICROVAX II (87)	10 APPLE MACINTOSH 50 IBM PC, PCXT 84 ZENITH 13 ZENITH 150 & ABOVE	159	56	1
CLEVELAND ST U	IBM 3081 (86) * VAX 750, 2 (84,86) * VAX 730, 2 (83,85) IBM 3090	23 IBM PC, PCXT 6 IBM PC/AT 57 IBM PS/2 220 PC, XT CLONES	306	11	1.2
U OF COLORADO, BOULDER	CDC 720 DEC VAX 11/750, 2 DEC VAX 11/780 DEC VAX 11/785	4 APPLE MACINTOSH 124 IBM PC, PCXT 12 IBM PC/AT 36 IBM PS/2	185	34	1
COLUMBIA U	* IBM 4381 * VAX 11-780 IBM 4381 SUN 4/280 MULTIMAX 510	11 APPLE MACINTOSH 4 APPLE MACINTOSH II 20 HP VECTRA 286 41 HP VECTRA 386 155 IBM PC, PCXT 6 IBM PC/AT 50 UNISYS 27 NCR	316	7	2.3

U OF CONNECTICUT	IBM 3090 (87)	6 APPLE MACINTOSH 34 IBM PC, PCXT 39 IBM PS/2 5 PC, XT CLONES 44 ZENITH 12 CORONA 5 NECA	148	32	1.7
CORNELL U (JOHNSON)	* VAX 785,8530 * MICROVAX II IBM 4381 IBM 3090 * HP 3000	54 APPLE MACINTOSH 16 APPLE MACINTOSH II 16 DEC RAINBOW 16 HP VECTRA 286 13 IBM PC, PCXT 21 IBM PS/2 24 PC, XT CLONES	166	8	0.8
DARTMOUTH COLLEGE (TUCK)	DIGITAL VAX CLUSTER HONEYWELL DPS IBM 4281	91 APPLE MACINTOSH 6 APPLE MACINTOSH II 17 IBM PC, PCXT 64 IBM PS/2	181	5	0.8
DUKE U (FUQUA)	* IBM 4381 (89) MODEL R23 * AT&T 3B2 (88)	85 AT & T 286 91 IBM PC, PCXT 8 IBM PC/AT 15 IBM PS/2 16 PC 286 CLONES 8 PC 386 CLONES 92 UNISYS 4 ZENITH 5 NCR 17 NO NAME GIVEN	341	6	1
EAST CAROLINA U	SPERRY 1100, 2 IBM 4381, 2 AT&T 32B DECV MVAX * AS/400	9 APPLE MACINTOSH 19 APPLE MACINTOSH II 8 IBM PC, PCXT 11 IBM PC/AT 47 IBM PS/2 21 ZENITH 150 & ABOVE	119	17	1.5
EAST TEXAS ST U	IBM 93/70, 2	46 IBM PC, PCXT 7 PC, XT CLONES 26 PACKARD BELL XTDONE	81	23	1.2
EMORY U	* VAX 11/750 (80) IBM 3090 VAX 8550	47 APPLE MACINTOSH 8 IBM PC, PCXT 13 PC 286 CLONES 35 ZENITH 31 ZENITH 150 & ABOVE	137	12	1.1
U OF FLORIDA	IBM 3090J (90) * IBM SYS 36 (88)	10 APPLE MACINTOSH 91 IBM PC, PCXT 9 IBM PC/AT 102 IBM PS/2 6 PC 386 CLONES	223	95	0.7

FLORIDA INTERNATIONAL U	DEC VAX 8800 (86)	37 IBM PC, PCXT 4 IBM PC/AT 10 PC 286 CLONES 87 ZENITH	142	69	1
FORT LEWIS COLLEGE	DEC VAX 3600	13 APPLE II SERIES 24 APPLE MACINTOSH 66 PC, XT CLONES	107	46	1.4
GEORGETOWN U	IBM IBM IBM VAX VAX	16 APPLE MACINTOSH II 63 IBM PC, PCXT 17 PC, XT CLONES 13 PC 286 CLONES 5 PC 386 CLONES	118	28	1.2
U OF GEORGIA	* IBM 4381 * AT&T 3B2/300 * SUN 4/2805 IBM 3090 (87) CDC CYBERS,4 AND DEC VAX	14 APPLE MACINTOSH 13 APPLE MACINTOSH II 48 AT & T 286 217 IBM PC, PCXT 27 IBM PC/AT 81 IBM PS/2 11 PC, XT CLONES 30 CORONA 8 MAC PLUS 9 MAC SE	462	22	1
GEORGIA SOUTHERN U	TI 990 DEC VAX 3800	8 IBM PC, PCXT 35 IBM PS/2 4 PC, XT CLONES 6 PC 286 CLONES 5 ZENITH	61	414	1.8
HARVARD U	* IBM 4381 (84) * DEC SYSTEM 1095 (79) * DEC VAX 8530 (87) * GENL AUTO ZEBRA 5820 (87) * DEC VAX 6410 (89)	184 APPLE MACINTOSH II 4 IBM PC, PCXT 163 IBM PC/AT 350 IBM PS/2	704	5	5.7
U OF HAWAII	IBM 3081 (81) VAX 8XXX (86,88) CYBER 180-830 (85) IBM 4381 (81)	46 IBM PC, PCXT 5 IBM PS/2 125 LEADING EDGE D	187	15	2.3
U OF HOUSTON	AS 9000 HONEYWELL DEC VAX (88)	19 APPLE MACINTOSH 98 IBM PC, PCXT 5 IBM PC/AT 25 IBM PS/2 98 PC, XT CLONES 35 ZENITH 31 COMPAQ DESKPRO	316	26	1

U OF ILLINOIS, URBANA-CHAMPAIGN	IBM CONVEX * IBM SYS S/36 CRAY	4 4 219 160 263 15	APPLE MACINTOSH HP VECTRA 386 IBM PC, PCXT IBM PC/AT IBM PS/2 ZENITH	667	23	0.9
INDIANA-PURDUE U, FORT WAYNE	VAX 11/780 IBM 4381	6 42	IBM PC, PCXT ZENITH 150 & ABOVE	50	50	1.2
INDIANA U (SOUTHBEND)		15 8	ZENITH 150 & ABOVE LEADING EDGE	23	0	2.9
JAMES MADISON U	DEC VAX 8650 (87) DEC VAX 8530 (87)	25 82 40 5 4	IBM PC, PCXT IBM PS/2 PC, XT CLONES PC 286 CLONES APPLE MAC SE	158	83	1
JOHN CARROL U	DEC VAX 8300 DEC VAX 8530				0	0
U OF KANSAS	DEC VAX 8650 IBM 3081 KS	8 45 62	APPLE MACINTOSH AT & T 286 ZENITH 150 & ABOVE	121	32	1.1
KANSAS ST U	IBM 3084 IBM 4381-1 MVS/SP (93)	23 88	IBM PC, PCXT ZENITH 150 & ABOVE	111	47	1.7
KENT ST U	IBM 3090 IBM 4381 VAX 11/780	75 4 19 24 6 10 6 39	IBM PC, PCXT IBM PC/AT PC, XT CLONES PC 286 CLONES PC 386 CLONES ZENITH ZENITH 150 & ABOVE ZENITH 386	184	60	1.4
LAMAR U		10 10 51	PC, XT CLONES PC 286 CLONES PC 386 CLONES	71	53	1.1
U OF LOUISVILLE	IBM 3090 (90) VAX CLUSTER (90)	4 5 26 190	APPLE MACINTOSH II IBM PC, PCXT IBM PS/2 ITT	229	17	1.2
LOYOLA COLLEGE	DEC VAX 11/785, 2				0	0
LOYOLA MARYMOUNT U (LA)	GNUSON N80 MOD 42 1 IBM 4341-12 * PRIME 2250 * DEC VAX 3400	53 5 11 4 26	IBM PC, PCXT PC, XT CLONES PC 286 CLONES FORTUNE 21:16 DEC STATION 212	100	26	1.2

LOYOLA U, CHICAGO	IBM 3081	55 IBM PC, PCXT 11 PC 386 CLONES 20 ATT 6300/XT	87	51	2
LOYOLA U, NEW ORLEANS	VAX 11/750 IBM 4361 IBM 9375	16 APPLE MACINTOSH 10 PC, XT CLONES 12 ZENITH	38	44	7
U OF MAINE	IBM 3090 AT&T 3B2	17 APPLE MACINTOSH 4 APPLE MACINTOSH II 23 AT & T 386 39 IBM PC, PCXT 4 IBM PS/2 4 ZENITH 5 ZENITH 150 & ABOVE	99	21	0.7
MARQUETTE U	DEC VAX CLUSTER, 5 * MERIDIAN MINI (NTI)	23 APPLE MACINTOSH 43 IBM PC, PCXT 11 IBM PC/AT 4 IBM PS/2 12 PC, XT CLONES 8 PC 286 CLONES 24 PC 386 CLONES 57 AT&T 8086	186	26	1.1
U OF MARYLAND	* VAX 750	7 APPLE MACINTOSH 28 APPLE MACINTOSH II 20 IBM PC, PCXT 30 IBM PC/AT 121 IBM PS/2	206	27	1.4
MIT (SLOAN)	* IBM 4381 (89) * ATT 3B2 (88)	85 APPLE MACINTOSH 40 APPLE MACINTOSH II 55 AT & T 286 33 AT & T 386 106 IBM PC, PCXT 89 IBM PC/AT 48 IBM PS/2	456	12	0.4
MEMPHIS ST U	VAX 8820 (88) UNISYS 2200/403 (80)	70 APPLE MACINTOSH 7 APPLE MACINTOSH II 41 IBM PC, PCXT 25 PC, XT CLONES 37 PC 286 CLONES 68 ZENITH 110 ZENITH 150 & ABOVE	361	19	0.9
MIAMI U (OHIO)	IBM 4381 MODEL 23 DIGITAL VAX 8250	15 APPLE MACINTOSH 120 IBM PC, PCXT 12 IBM PS/2 64 PC, XT CLONES 34 PC 286 CLONES	248	82	0.9

U OF MICHIGAN	IBM 3090-600E (MTS) AMDAHL 5860 DEC VAX (OCC USE)	109 6 60 480	APPLE MACINTOSH IBM PC, PCXT IBM PS/2 UNISYS	657	13	0.6
U OF MINNESOTA	CYBER * IBM 4341 CRAY 2 ENCORE VAX 8600	23 8 20 35 85 60 60	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES ZENITH	291	98	0.7
MISSISSIPPI ST U	SPERRY 1174 (85)	20 5 202 5 6 8 55 20	APPLE II SERIES IBM PC, PCXT PC, XT CLONES PC 286 CLONES PC 386 CLONES TANDY UNISYS ZENITH 150 & ABOVE	321	15	1
U OF MISSOURI, ST LOUIS	IBM 4381 (86) IBM 30XX (87) DEC VAX (86)	47 17	IBM PC, PCXT IBM PS/2	65	293	1.3
MONTANA ST U	DEC VAX NETWORK UNIX	23 5	ZENITH 150 & ABOVE AT&T 8088	35	0	1
U OF NEW MEXICO (ANDERSON)	* IBM AS-400 (90)	5 8 65 27 11	APPLE MACINTOSH II DEC RAINBOW IBM PC, PCXT IBM PS/2 ZENITH	119	26	1.1
U OF NEW ORLEANS	VAX 8600 CLUSTER (84) IBM 4381 (86)	37 41	ZENITH ZENITH 150 & ABOVE	83	142	2.1
NEW YORK U	* VAX 8700(87), 8550 (90) * VAX 11/7XX, 2(82) 1(90) * MICROVAX II (92) * SUN 4/280 IBM 3090	30 6 55 265 15 115 32 76 200	APPLE MACINTOSH APPLE MACINTOSH II HP VECTRA 386 IBM PC, PCXT IBM PC/AT IBM PS/2 PC 386 CLONES ZENITH ZENITH 150 & ABOVE	794	16	0.6
NICHOLLS ST U	UNISYS A6 (87) * DEC 11/70 (87)	5 110	ZENITH ZENITH 150 & ABOVE	115	12	1.6
U OF NORTH DAKOTA	IBM 3090-180 IBM 3081-032 VAX 11/780	75 5 5 78	IBM PC, PCXT PC, XT CLONES PC 286 CLONES ZENITH	171	19	0.8

U OF NORTH FLORIDA		15 IBM PC, PCXT 45 ZENITH	60	0	1.2
U OF NORTH TEXAS	NAS 8083(ACADEMIC) NAS 8083(ADMIN) VAX * TI-990/12 * TI-EXPLORERS	331 PC, XT CLONES 120 PC 286 CLONES 25 PC 386 CLONES	476	24	1.3
NORTHERN ARIZONA U	IBM 4381 (85) IBM 9370 (88) VAX (87)	17 IBM PC, PCXT 12 IBM PC/AT 65 IBM PS/2 90 PC, XT CLONES 61 PC 286 CLONES	247	6	0.9
NORTHERN ILLINOIS U	* HP 3000 (88) * KAYPRO PC	24 HP VECTRA 286 114 IBM PC, PCXT 98 PC, XT CLONES 6 PC 286 CLONES	247	53	1
OAKLAND U, MICHIGAN	* DEC VAX 8350 (88) DEC VAX 6320 (90) DEC VAX 6310 (90) HONEYWELL MULTICS	11 IBM PC, PCXT 39 PC, XT CLONES 50 UNISYS 40 DEC VAXMATES	150	18	0.9
OHIO ST U	* PRIME 9955 * NCR TOWER 600 * BANYON SERVER	83 APPLE MACINTOSH 5 APPLE MACINTOSH II 55 IBM PC, PCXT 10 IBM PC/AT 15 PC, XT CLONES 8 PC 286 CLONES 4 PC 386 CLONES 20 ZENITH 150 & ABOVE 37 NCR PC6 87 NCR PC8 8 NO BRAND GIVEN	345	22	1
U OF OREGON	VAX 8850	51 APPLE MACINTOSH 49 HP VECTRA 286 5 HP VECTRA 386 11 IBM PC, PCXT 7 PC, XT CLONES	128	35	1.5
OREGON STATE U	CYBER IBM 4381 FPS/VAX	51 HP VECTRA 286 26 HP VECTRA 386 104 LEADING EDGE 25 AST 286 57 AST 386	273	22	0.5
U OF THE PACIFIC	DEC VAX 11/785 (85)	6 IBM PC, PCXT 18 IBM PS/2 5 PC, XT CLONES	30	0	1.1
PACIFIC LUTHERAN U	VAX 6200 & 6220 (88)	13 IBM PC, PCXT 10 IBM PC/AT	24	109	3.4

PAN AMERICAN U		78 PC 286 CLONES 58 ZENITH 150 & ABOVE	139	31	1.5
PURDUE U (KRANNERT)	ETA-10 IBM 3090 (85) CYBER 205 (84) VAX 8600 (89) SEQUENT SYMMETRY (89)	87 APPLE MACINTOSH 19 APPLE MACINTOSH II 73 HP VECTRA 286 23 HP VECTRA 386 12 IBM PC, PCXT 27 IBM PC/AT 6 IBM PS/2 4 ZENITH 37 IBM 6152 7 HP 9000/319	295	21	1
U OF ROCHESTER (SIMON)	* HP 3000 (82) * IBM 4361 (85)	94 APPLE MACINTOSH 22 APPLE MACINTOSH II 10 HP VECTRA 286 25 IBM PC, PCXT 28 IBM PC/AT 40 IBM PS/2 20 PC, XT CLONES 13 PC 286 CLONES 4 PC 386 CLONES	258	11	0.5
ROLLINS COLLEGE (CRUMMER)	VAX 11/750	25 AT & T 286 6 IBM PC/AT 29 IBM PS/2	60	7	1.2
RUTGERS U	AS-9000 VAX 8650 VAX 8550 PYRAMID 9810-TA	4 APPLE MACINTOSH 6 AT & T 386 35 IBM PC, PCXT 130 ZENITH 9 ZENITH 150 & ABOVE 30 MITSUBISHI 286	219	13	1
SANTA CLARA U	VAX-8650	95 IBM PC, PCXT 7 PC 286 CLONES	106	51	1.9
SEATTLE U	ENCORE IBM	6 IBM PC, PCXT 22 PC, XT CLONES 4 PC 286 CLONES	34	365	1.5
U OF SOUTH ALABAMA	IBM 4341 GROUP 2	20 IBM PC, PCXT 47 IBM PS/2	67	0	1.1
U OF SOUTH CAROLINA	* IBM 4381 P-14 (88) IBM 3081-D24,2 (83,84) DEC VAX 11-780 (84) * IBM SYS 36 FPS MT-64	71 APPLE MACINTOSH 109 IBM PC, PCXT 10 IBM PC/AT 55 IBM PS/2 36 PC 386 CLONES 33 ZENITH 150 & ABOVE	323	29	1.1

U OF SOUTH DAKOTA	**IBM 4381 MOD 14 (84)**	5 IBM PC, PCXT 34 IBM PS/2 13 PC, XT CLONES 4 ZENITH 16 AT&T 8086	72	26	1.2
U SOUTHERN CALIF	IBM 3081 MVS IBM 3090	43 APPLE MACINTOSH 17 APPLE MACINTOSH II 5 HP VECTRA 286 34 HP VECTRA 386 237 IBM PC, PCXT 19 IBM PC/AT 4 IBM PS/2 30 PC, XT CLONES 100 PC 286 CLONES 69 PC 386 CLONES 5 AST 286	564	26	1.1
SOUTHERN ILLINOIS U, CARBONDALE	IBM 3081 IBM 3090	83 IBM PC, PCXT 19 IBM PS/2 15 PC, XT CLONES 7 ZENITH	125	93	0.9
SOUTHERN ILLINOIS U, EDWARDSVILLE	IBM 4381 (86)	7 IBM PC, PCXT 8 IBM PC/AT 52 ZENITH 147 ZENITH 150 & ABOVE	217	14	1.4
SOUTHERN METHODIST U	IBM 3081 (84) * AT&T 3B15 (87) * AT&T 3B2 (86) IBM 3081 (89)	6 APPLE MACINTOSH 21 AT & T 286 10 AT & T 386 30 IBM PC, PCXT 65 PC 286 CLONES 8 PC 386 CLONES 20 AT&T 6300	167	17	1.2
U OF SOUTHERN MISSISSIPPI	HONEYWELL DPS-90 * IBM SYS 36	13 IBM PC, PCXT 5 PC, XT CLONES 52 TANDY 6 LEADING EDGE	78	66	3.1
STATE U NEW YORK, BUFFALO	DEC VAX 780, 750 IBM 3083	74 IBM PC, PCXT 7 IBM PC/AT 27 IBM PS/2 7 IBM MODEL 30-286	119	64	1.2
SUFFOLK U	PRIME 6350	5 APPLE MACINTOSH 5 IBM PC, PCXT 47 PC, XT CLONES 37 PC 286 CLONES 4 PC 386 CLONES	100	31	1.7
SYRACUSE U	IBM 3090 DEC VAX 8600	8 APPLE MACINTOSH 75 IBM PC, PCXT 16 IBM PS/2 10 ZENITH	117	64	1.8

TENNESSEE TECH U	VAX-11, 3 (85) DEC 8800 (87)	29 DEC RAINBOW 17 IBM PC, PCXT 23 PC LIMITED	70	55	1.2
U OF TEXAS, ARLINGTON	IBM 4341 IBM 4381 NOVELL LAN	72 IBM PC, PCXT 8 OLIVETTI	81	108	6.2
TEXAS A&M U	AMDAHL * IBM 4361 (84) IBM 3090 CRAY Y-MP (89)	30 APPLE MACINTOSH 25 APPLE MACINTOSH II 32 DEC RAINBOW 45 HP VECTRA 286 106 IBM PC, PCXT 5 IBM PC/AT 30 IBM PS/2 60 ZENITH 25 TI	359	28	1.9
TEXAS TECH U	IBM 3081-KX VAX 8650 & 780 * VAX 750 * AT&T 3B2 * VAX 6000-310	15 APPLE MACINTOSH 4 APPLE MACINTOSH II 32 DEC RAINBOW 10 IBM PC, PCXT 8 PC 386 CLONES 125 ZENITH 150 & ABOVE 17 PACKARD BELL AT 10 COMPUADD 286	221	44	1.3
TULANE U	IBM 3831	13 APPLE MACINTOSH 11 IBM PC, PCXT 51 PC, XT CLONES 42 ITT XTRA	120	17	1.6
U OF UTAH	IBM 3090 600S	5 APPLE MACINTOSH 6 APPLE MACINTOSH II 30 IBM PC, PCXT 28 PC 286 CLONES 27 PC 386 CLONES 80 SPERRY & LEADING EDGE	185	12	1
UTAH STATE U	VAX 8650 IBM 4341	40 IBM PS/2 27 PC 386 CLONES 14 UNISYS 155 TELEVIDEO 1605	236	12	0.7
VANDERBILT U (OWEN)	VAX 8800 IBM	33 APPLE MACINTOSH 6 APPLE MACINTOSH II 40 AT & T 386 12 IBM PC/AT 19 IBM PS/2 5 ZENITH	117	9	0.8
U OF VERMONT	IBM 4081, 2 (85,87) DEC 8600 (85) * DEC 780 (85) * DG MV10000 (85)	4 IBM PS/2 38 AT & T PC 6300	49	93	0.9

U OF VIRGINIA (DARDEN)	CDC CYBER 855 PRIME 750 * WANG VS 7010 (88) IBM 3090	25 APPLE MACINTOSH 7 APPLE MACINTOSH II 67 IBM PC, PCXT 21 IBM PC/AT 54 IBM PS/2 6 PC, XT CLONES 16 PC 286 CLONES	200	7	0.9
U OF VIRGINIA (MCINTIRE)	* IBM 9370 * ATT 3B2-1000	20 APPLE II SERIES 17 AT & T 286 30 AT & T 386 11 IBM PC, PCXT 20 IBM PS/2 97 PC 286 CLONES 10 AT & T 6300	206	6	0.8
VIRGINIA COMMONWEALTH U	PYRAMID 90X (86) IBM 3081 (80) IBM 4341 (87)	200 IBM PC, PCXT 25 IBM PS/2 20 PC, XT CLONES 13 PC 286 CLONES 36 PC 386 CLONES	299	0	.
VIRGINIA TECH (PAMPLIN)	IBM 3090 (88) IBM 3084 (85) DEC VAX 11/780, 2 (83)	135 IBM PC, PCXT 8 IBM PC/AT 6 IBM PS/2 6 PC 286 CLONES 41 ZENITH 150 & ABOVE	201	53	1
WAKE FOREST U (BABCOCK)	PRIME 4150 (88)	7 IBM PS/2 85 ZENITH 150 & ABOVE	104	7	1.1
U OF WASHINGTON	CDC CYBER 180/845 (87) DEC VAX 8700 IBM 3090	13 APPLE MACINTOSH 43 APPLE MACINTOSH II 44 HP VECTRA 286 75 IBM PC, PCXT 24 IBM PC/AT 19 IBM PS/2 4 PC, XT CLONES 4 ZENITH	227	21	1.5
WASHINGTON U (OLIN)	IBM 43XX, 4 * VAX 8810 (88) * VAX 6620 (88)	4 APPLE MACINTOSH II 27 IBM PC, PCXT 40 IBM PC/AT 10 IBM PS/2 16 PC 286 CLONES 11 PC 386 CLONES	112	21	1.2
WASHINGTON AND LEE U	PRIME 9955 (84)	34 IBM PS/2 25 PC 286 CLONES	59	3	0.4
WAYNE STATE U	AMDAHL 470V/8 IBM 4381 IBM 3080GX	6 APPLE MACINTOSH 25 IBM PC, PCXT 26 IBM PS/2 14 PC 286 CLONES 4 PC 386 CLONES 155 ZENITH 150 & ABOVE	236	30	0.8

WESTERN CAROLINA U	DIGITAL CAV 11/780 (82) DIGITAL 8530 (87)	4 IBM PC/AT 25 ZENITH 29 EPSON EQUITY III+ 8 ZENITH 386 14 ZENITH 286	82	22	3.2
WESTERN ILLINOIS U	IBM 4381, 2 (84,87) DEC MICROVAX II (86) CDC CYBER 180-830 (79)	39 IBM PC, PCXT 4 IBM PS/2 49 ZENITH 39 ZENITH 150 & ABOVE 21 ZENITH 3865X	158	41	1.2
WINTHROP COLLEGE	* DGMV 8000 II (84)	6 IBM PS/2 125 PC, XT CLONES	133	18	1.5
U OF WISCONSIN, LA CROSSE	VAX 11/780	43 IBM PC, PCXT 36 ZENITH 150 & ABOVE	81	45	2.3
U OF WISCONSIN, MADISON	DEC VAX 6310 * DEC VAX 6410	10 APPLE MACINTOSH 46 AT & T 286 28 AT & T 386 102 IBM PC, PCXT 11 IBM PC/AT 29 IBM PS/2	230	16	1
U WISCONSIN, OSHKOSH	IBM 4380 VAX, 2	20 IBM PC, PCXT 5 ZENITH 25 ZENITH 150 & ABOVE	54	0	0.9
U OF WISCONSIN, WHITEWATER	IBM 4341 (85) VAX 11-780 (84)	20 APPLE II SERIES 53 APPLE MACINTOSH 19 APPLE MACINTOSH II 6 IBM PC, PCXT 12 ZENITH 150 & ABOVE	115	67	2.4
WRIGHT STATE U	VAX 750, 3 VAX 785, 1 IBM 3083B	68 PC, XT CLONES 27 ZENITH 150 & ABOVE 4 3COM WORKSTATIONS 7 GRID	108	0	1
U OF WYOMING	DEC 11/785 (85) IBM 3081 (86) VAX DEC 8800, 2 (87)	13 IBM PC, PCXT 71 ZENITH 150 & ABOVE 15 ZENITH 248 5 ZENITH 386	109	24	1.4
YALE U	IBM 3090 (85) AMDAHL V8 DEC VAX 8600 (86) * DEC VAX 750 * CELEBRITY 1260 D	24 APPLE MACINTOSH 7 APPLE MACINTOSH II 38 IBM PC, PCXT 61 IBM PC/AT 70 IBM PS/2	202	5	1.5

U OF ALBERTA	AMDAHL 5870 (78) MTS IBM 4381 (80) VM IBM 3081 (K) MVS	71 APPLE MACINTOSH 25 APPLE MACINTOSH II 69 IBM PC, PCXT 8 IBM PC/AT 8 IBM PS/2 11 PC, XT CLONES 7 PC 386 CLONES 5 ZENITH 16 ZENITH 150 & ABOVE	222	22	1.3
U BRITISH COLUMBIA	* DATA GEN MV10000 UBC MAINFRAME	6 APPLE MACINTOSH 51 IBM PC, PCXT 68 PC, XT CLONES 12 PC 386 CLONES 53 UNISYS 7 ZENITH 5 BRAND NOT GIVEN	207	22	1
U OF CALGARY	HONEYWELL DPS/870M CDC CYBER 860 IBM 3081 CDC CYBER 870	80 IBM PC, PCXT 66 IBM PC/AT 66 IBM PS/2	212	13	1.3
UNIVERSITE LAVAL	* SUN * MICRO VAX IBM 4381 CONVFX	109 APPLE MACINTOSH 170 IBM PC, PCXT 26 IBM PC/AT 45 IBM PS/2	353	27	.
MCGILL U	IBM 3090 IBM 4341 * DECSERVER 3100	36 IBM PC, PCXT 10 IBM PS/2 51 PC, XT CLONES 39 PC 286 CLONES 36 PC 386 CLONES	176	34	1.3
MCMASTER U	IBM 4381 VAX 11/780 VAX 6420 VAX 8530	38 IBM PC, PCXT 25 IBM PS/2 36 PC, XT CLONES 5 PC 286 CLONES 5 PC 386 CLONES 25 ZENITH	137	34	1.1
QUEEN'S U, KINGSTON	IBM 3081 G IBM 4381	10 APPLE MACINTOSH 37 IBM PC, PCXT 6 IBM PS/2 7 PC, XT CLONES 23 PC 286 CLONES 8 PC 386 CLONES 30 ZENITH 150 & ABOVE	133	26	0.8
U TORONTO	* DATAGEN MV15000 MOD 10	9 APPLE MACINTOSH 4 APPLE MACINTOSH II 4 IBM PC, PCXT 26 PC, XT CLONES 21 ZENITH 40 OLIVETTI M280	105	27	4.4
U WESTERN ONTARIO	* IBM 4381 MOD 13 (85)	20 HP VECTRA 286 105 IBM PC/AT 15 IBM PS/2	143	21	1.2

Appendix 3

Table 3A
Total Business School Equipment, Maintenance, and Services
by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Peripheral purchases	110	2629	29	1608	28	554	28	289	25	178
Maintenance	107	2107	28	1336	30	483	26	218	23	69
Equipment insurance	11	40	4	19	2	4	2	15	3	2
Hardware leases	7	180	5	69	2	111	0	0	0	0
Computer cycles	35	5028	19	4413	11	538	4	76	1	2
Projection equipment	64	455	16	235	19	98	19	104	10	19
Furniture	59	257	13	76	13	113	19	55	14	14
Calculated total		10696		7756		1901		757		284
Reported total	122	10819	31	7861	32	1882	31	757	28	319
Total dollars (%)		**%**		**%**		**%**		**%**		**%**
Peripheral purchases		25		21		29		38		63
Maintenance		20		17		25		29		24
Equipment insurance		0		0		0		2		1
Hardware leases		2		1		6		0		0
Computer cycles		47		57		28		10		1
Projection equipment		4		3		5		14		7
Furniture		2		1		6		7		5
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Peripheral purchases	110	24	29	55	28	20	28	10	25	7
Maintenance	107	20	28	48	30	16	26	8	23	3
Equipment insurance	11	4	4	5	2	2	2	8	3	1
Hardware leases	7	26	5	14	2	56	0	0	0	0
Computer cycles	35	144	19	232	11	49	4	19	1	2
Projection equipment	64	7	16	15	19	5	19	5	10	2
Furniture	59	4	13	6	13	9	19	3	14	1
Average (Calculated total)		88		250		59		24		10
Average (Reported total)	122	89	31	254	32	59	31	24	28	11

Table 3B
Total Business School Consumables Expenditures
by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Comp.paper/ribbons/toner	97	967	21	447	28	335	28	128	20	58
Office supplies	68	256	18	69	21	114	18	55	11	18
Disks/tapes/magnetic media	86	288	20	158	25	75	26	39	15	16
Xerox/printing charges	60	370	14	39	21	176	17	118	8	39
Calculated total		1881		713		700		340		131
Reported total	116	2136	28	861	31	748	32	367	25	160
Total dollars (%)		**%**		**%**		**%**		**%**		**%**
Comp.paper/ribbons/toner		51		63		48		38		44
Office supplies		14		10		16		16		14
Disks/tapes/magnetic media		15		22		11		11		12
Xerox/printing charges		20		5		25		35		30
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Comp.paper/ribbons/toner	97	10	21	21	28	12	28	5	20	3
Office supplies	68	4	18	4	21	5	18	3	11	2
Disks/tapes/magnetic media	86	3	20	8	25	3	26	2	15	1
Xerox/printing charges	60	6	14	3	21	8	17	7	8	5
Average (Calculated total)		16		25		23		11		5
Average (Reported total)	116	18	28	31	31	24	32	11	25	6

Table 3C
Total Business School Software Expenditures
by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Outright purchase	118	1320	28	571	31	450	31	170	28	129
Annual fee or license	66	570	24	304	21	199	9	37	12	30
Calculated total		1890		875		649		207		159
Reported total	122	2004	30	955	25	649	31	207	30	193
Total percentages		**%**		**%**		**%**		**%**		**%**
Outright purchase		70		65		69		82		81
Annual fee or license		30		35		31		18		19
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Outright purchase	118	11	28	571	31	450	31	170	28	129
Annual fee or license	66	9	24	304	21	199	9	37	12	30
Average (Calculated total)		15		875		649		207		159
Average (Reported total)	122	16	30	955	25	649	31	207	30	193

Table 3D
Total Business School Data Acquisition Expenditures
by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Tape based	64	800	22	387	16	194	18	156	8	63
CD-ROM based	31	283	15	166	7	79	6	29	3	9
On-line information services	36	114	13	39	11	56	6	8	6	12
Calculated total		1197		592		329		193		84
Reported total	84	1294	26	615	22	342	22	193	14	145
Total dollars (%)		**%**		**%**		**%**		**%**		**%**
Tape based		67		65		59		81		75
CD-ROM based		24		28		24		15		11
On-line information services		10		7		17		4		14
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Tape based	64	13	22	18	16	12	18	9	8	8
CD-ROM based	31	9	15	11	7	11	6	5	3	3
On-line information services	36	3	13	3	11	5	6	1	6	2
Average (Calculated total)		14		23		15		9		6
Average (Reported total)	84	15	26	24	22	16	22	9	14	10
Data acquisition		**%**		**%**		**%**		**%**		**%**
Tape based		88		77		81		99		131
CD-ROM based		64		49		75		55		50
On-line information services		22		13		34		15		33
Total (actual reported)		174		139		191		169		215

Table 3E
Total Business School Telecommunication Expenditures
by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Telephones	72	556	22	252	21	55	18	228	11	21
Data line charges	32	267	15	200	8	48	8	17	1	2
Calculated total		823		452		103		245		23
Reported total	84	902	26	508	23	113	22	258	13	24
Total dollars (%)		**%**		**%**		**%**		**%**		**%**
Telephones		68		56		53		93		91
Data line charges		32		44		47		7		9
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Telephones	72	8	22	11	21	3	18	13	11	2
Data line charges	32	8	15	13	8	6	8	2	1	2
Average calculated total		10		17		4		11		2
Average reported total	84	11	26	20	23	5	22	12	13	2

Table 3F
Total Business School Miscellaneous Expenditures
by Computer Dollar per Student Quartiles
N = 131

	Total		Quartile 1st		2nd		3rd		4th	
Total dollars	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Computer staff development	76	260	25	169	23	53	19	18	9	20
Subscriptions/books/journals	79	67	25	39	25	16	19	8	10	5
User groups/memberships	29	16	13	10	11	3	2	2	3	2
Calculated total		343		218		72		28		27
Reported total	95	356	28	225	29	77	24	27	14	28
Total percentages		**%**		**%**		**%**		**%**		**%**
Computer staff development		76		78		74		64		74
Subscriptions/books/journals		20		18		22		29		19
User groups/memberships		5		5		4		7		7
Per school averages	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**	**N**	**$000s**
Computer staff development	76	3	25	7	23	2	19	1	9	2
Subscriptions/books/journals	79	1	25	2	25	1	19	0	10	1
User groups/memberships	29	1	13	1	11	0	2	1	3	1
Average (Calculated total)		4		8		2		1		2
Average (Reported total)	95	4	28	8	29	3	24	1	14	2

U OF ARKANSAS

DAVID DOUGLAS
HEAD OF CISQA
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DD24123@UAFSYSB

WE ARE USING 16MB TOKEN-RING LANS BRIDGED TO 4MB TOKEN-RING LANS CONNECTED TO THE UA BACKBONE VIA A PROTEON ROUTER. THE BACKBONE IS AB 80MB BACKBONE. THE COLLEGE USES A GROUPWARE PRODUCT (WORDPERFECT OFFICE) FOR CALENDARING, E-MAIL, ETC.

BOSTON COL

PETER YUGEL
ASSOC. PROFESSOR
(617) 552-3979
KOGEL@BCVAX

FACULTY RESOURCE CENTER. MICHAEL CONNOLLY (617) 552-3912
INFORMATION PROFESSION CENTER. WILLIAM FLEMMIM (617) 552-8509
INSTRUCTIONAL RESOURCE & DEV CENTER. PETER OLIVIERI (617)552-3907
ROBOTICS LAB. JAMES GIRS (617) 552-3981

BRADLEY U

GALE SULLENBERGER
DEAN, COLLEGE OF BUSINESS ADMINISTRATION
(309) 677-2255

ALL RESIDENCE HALLS HAVE NETWORKED AT&T PC'S IN THE ROOMS. COLLEGE OF BUSINESS ADMN HAS EXCELLENT COMPUTER INSTRUCTIONAL FACILITY WITH LAN, 21PC'S, VIDEO REAR PROJECTION SYSTEM AND EXTENSIVE SOFTWARE. THIS IS A MODEL FACILITY.

BRIGHAM YOUNG U

LEE RADEBAUGH
ASSOC. DEAN
(801) 378-4123

BY SUMMER WE SHOULD HAVE A NETWORK LINKING ALL FACULTY AND ADMIN OFFICES AND COMOPUTER LABS IN THE SCHOOL OF MGT.

CAL ST U, SACRAMENTO

ALLAN J. DOMURET, PHD
DIRECTOR OF COMPUTER SERVICES
(916) 278-7214

1. FACULTY ADVANCED COMPUTER FACILITY: LATEST IN HIGH-TECH

HARDWARE & SOFTWARE FOR FACULTY USE;E.G. 80386(80486 ANTICIPATED) COLOR PRINTER (TEKBRONIX) MACIICX, LASER PRINTERS (INCLUDING POSBSCRIPT).
2. ELECTRONIC CLASSROOM: 30 AT'S FOR STUDENTS, 2 AT'S FOR INSTRUCTORS, (CEILING MOUNT 7 W/ REMOTE, ELECTROHOME), LAN, LASER PRINTER. USED FOR CLASSROOM, HANDS-ON COMPUTER APPLICATIONS INSTRUCTION.

CAL ST U, HAYWARD

MIKE CAVANAGH
COMPUTING COORDINATOR
(415) 881-3532
MCAVANAG@SEQ.CSUHAWARD.EDU

WE HAVE A NOVELL NETWORK AND AN INTERACTIVE COMPUTER CLASSROOM USED FOR COMBINING CLASS LECTURE AND COMPUTER GROUP USAGE.

CARNEGIE MELLON U

F. (MEENA) LAKHAVANI
DIRECTOR OF COMPUTING
(412) 268-2713
FL08@ANDREW.CMU.EDU

STOCK MARKET SIMULATION LABORATORY.

CASE WESTERN U (WEATHERHEAD)

ROBERT A. KNIGHT
ASSOCIATE DIRECTOR OF ADMINISTRATION
(216) 368-5330
RAK2@PO.CWRU.EDU

THE WEATHERHEAD SCHOOL OF MGT WAS ONE OF THE FIRST BUSINESS SCHOOLS IN THE COUNTRY TO UTILIZE STATE-OF-THE-ART NETWORKING & COMPUTING FACILITIES TO ENHANCE THE QUALITY OF ITS INSTRUCTION, RESEARCH AND ADMN. "GUIDE TO THE LAB" DESCRIBES SOME OF THE HARDWARE, SOFTWARE AND SERVICES AVAILABE.

U OF COLORADO, BOULDER

EDWARD J. MAES
ASSISTANT TO DEAN
(303) 492-1805
MAES E

COLLEGE HAS THREE COMPUTER LABS.
1. INSTRUCTION- 40 ZENITH XT'S FOR LAB USE.
2. COMPUTER LAB WITH LOCAL AREA NETWORK.
3. 9 IBM COMPATIBLES AND 10 APPLE COMPUTERS.
SOFTWARE AVAILABLE:
- WORDPERFECT
- SPSS
- PALMER BERGE
- MICROSOFT WORD
- LOTUS, 123.

EAST CAROLINA U

RICHARD KERNS
ASSOC. DEAN FOR COMPUTING SERVICES
(919) 757-6350
SBKERNS@ECUVM

EXCELLENT STUDENT COMPLEX WITH LAB, 2 CLASSROOMS, AND MINI/ MAINFRAME ROOM--TOKEN RING, BROADBAND, RAISED FLOORS, AND LARGE SCREEN PROJECTOR.

U OF GEORGIA

BARBRE S. MCLEROY
DIRECTOR, CBA COMPUTER CENTER
(404) 542-3823
BMCLEROY@UGA

NOVELL NW CONNECTING 3 BUILDINGS PROVIDING SMA ACCESS. ACCESS TO UNIV'S BROADBAND & INTERNET IN NEAR FUTURE. MICROCOMPUTER CLASSROOMS WITH DATA PROJECTOR SYSTEMS. HIRED A FACULTY MEMBER TO DEVELOP COMPUTER-BASED COURSE SUPPORT PROJECTS FOR MAJOR CORE COURSES. RESEARCHING DIAL-IN CAPABILITY TO COLLEGES NETWORK W/ FALL QUARTER 1990 AS TARGET PRODUCTION DATE.

U OF HOUSTON

MICHAEL WALTERS
DIRECTOR, COMPUTING SERVICES
(713) 749-6825

WE ARE WORKING ON 2 MAJOR PROJECTS IN '90 WHICH MAY NOT BE "INNOVATIVE" OR "EXCITING" BUT WE'D BE HAPPT TO SHARE INFO WITH OTHER INTERESTED PARTIES:
1. DEVELOPING 2 HYPERTEXT-BASED SYSTEMS (1 FOR MAC, 1 ON NOVELL NW USING MS-DOS MACHINES) TO ANSWER MAJORITY OF INTRO STUDENTS QUESTIONS THAT ARE NOW HANDLED BY OUR STUD HELP DESK.(DOS,WP,ETC)
2. RESEARCHING EXTENT AND TYPES OF COMPUTER DATA PROBLEMS IN INDUSTRY AND BUS SCHOOL PLUS PRACTICAL APPROACHES TO COMBAT THESE PROBLEMS IN ERA OF DISTRIBUTED PROCESSING,NETWORKING PC'S, ETC.

INDIANA-PURDUE U, FORT WAYNE

JAMES S. MOORE
ASSOC PROFESSOR OF MGT
(219) 481-6488
GOLD:MOOREJ@IUBACS

MULTI-CAMPUS LINK VIA D.C.A. SWITCH ENABLES SATELITE CAMPUSES TO SHARE VAST HARDWARE CAPABILITIES AT MAIN CAMPUS.
WE ENJOY ACCESS TO BOTH IU-BLOOMINGTON & PURDUE-W. LAFAYETTE MAINFRAME FACILITIES VIA OFFICE WORKSTATIONS.

JOHN CARROL U

MARC P. LYNN
ASST PROFESSOR
(216) 397-1640
LYNN@JCUVAX

ON GOING PROJECT "INTEGRATINGMGMT INFO TECH INTO BUSINESS CIRRICULA" INVOLVES $3.8 MILLION EXPANSION/RENOVATION. PHASE III FOCUSES ON SELECTION/INSTALLATION OF EQUIPMENT FOR HIGH TECH CLASSROOMS.

LAMAR U

BEHERUZ N. SETHNA
DEAN
(409) 880-8603

ONE OF OUR FACULTY HAS EARNED NATIONAL RECOGNITION FOR 6 CONSECUTIVE YEARS IN INSTRUCTIONAL INNOVATION. SEE DSI PROCEEDINGS FOR THE PAST 6 YEARS (SETHNA) FOR DETAILS OF SUCH INNOVATIONS (INSTRUCTIONAL INNOVATION AWARD COMPETITION). OTHER FACULTY TOO ARE VERY ACTIVE IN THIS REGARD. (IAIM-1989 PROCEEDINGS, LATEST ISSUE OF INTERFACE, ETC.)

U OF MAINE

VIRGINIA GIBSON
ASSOC PROFESSOR OF MIS
(207) 581-1981
GIBSON@MAINE

THIS YR WE RECEIVED A HALF-MILLION DOLLAR EQUIPMENT GRANT FROM AT&T TO ESTABLISH AN ADVANCED FINANCIAL DECISION SUPPORT SYSTEMS LAB. STUDENTS WILL RECEIVE LIVE OPTIONS AND LECTURES PRICES VIA SATELLITE AND WILL PARTICIPATE IN A SIMULATED COMMODITY TRADING EXERCISE. WE EXPECT THE LAB TO BE UP AND RUNNING BY SEPT.

MIT (SLOAN)

ANNE DRAZEN
DIRECTOR OF INFORMATION SYSTEMS
(617) 253-3048
ADRAZEN@SLOAN

MULTIMEDIA CAR SHOWROOM -- MAC.
MANAGEMENT FLIGHT SIMULATOR -- MAC.
CONTACT ME FOR MORE ABOUT THESE INNOVATIONS.

U OF MICHIGAN

ELAINE DIDIER
DIRECTOR, INFO RECOURCES
(313) 764-2438

ELAINE DIDIER@UM.CC.UMICH.EDU

COLLABORATION TECHNOLOGY SUITE (COMPLETED SPRING 1990) AT THE COGNITIVE SCIENCE AND MACHINE INTELLIGENCE LAB (CSMIL) OF THE BUS SCHOOL. THIS NEW LAB IS FURNISHED WITH 8 MACINTOSH IICX COMPUTERS, LARGE REAR SCREEN PROJECTION SYSTEM AND VIDEO OBSERVATION EQUIPMENT. ITS FOCUS IS RESEARCH ON COMMINICATION AND DECISION MAKING FACILITATED BY COMPUTER TECHNOLOGY; AND DEVELOPMENT OF SHARED DEITING SYSTEMS AND GRAPHICAL INTERFACES FO R GROUP INTERACTION. FOR FURTHER INFO, CONTACT SHE SCHUON, ADMINISTRATIVE ASSISTANT, (313) 747-3110.

MISSISSIPPI ST U

DENNIS R. LEYDEN
DEAN
(601) 325-2580

INTERACTIVE CLASSROOM--48 STATIONS.

U OF NEW MEXICO (ANDERSON)

DAVID BULLOCK
DIRECTOR OF COMPUTING SERVICES
(505) 277-2061

WE ARE DEVELOPING A COMPUTER INTEGRATED MFG LAB FACILITY IN CONJUNCTION W/ THE ENGINEERING COLLEGE.

NICHOLLS ST U

BRUCE L. MCMANIS
DIRECTOR
(504) 448-4188

WE HAVE AN ELECTRONIC BULLETIN BOARD SYSTEM THAT DISPLAYS NEWS ITEMS ON IDLE TERMINALS, WE ALSO HAVE A STUDENT INFORMATION RETRIEVAL SYSTEM THAT ALLOWS STUDENTS TO HAVE EASY ACCESS TO LECTURE NOTES, HOMEWORK PROBLEMS SOFTWARE, AND E-MAIL.

U OF NORTH TEXAS

CENGIZ CAPAN
DIRECTOR
(817) 565-3049

AI LABS WITH 2 TI EXPLORER SYSTEMS.
MAINFRAME LAB WITH 30 AT'S NETWORKED -- MICROFOCUS COBOL FOR 100% MAINFRAME COMPATIBILITY WITH THE AT'S.
CASE LAB--20 AT'S AND 386 SYSTEMS WITH CASE TOOLS.

NORTHERN ARIZONA U

H. RONALD PITT
ASSOC DEAN
(602) 523-7348

WE HAVE RECENTLY INSTALLED A 50 USER INTERACTIVE NOVELL SFT PC LAB FOR TEACHING OR C/S AND WORKSHOP COURSES. USER SOFTWARE INCLUDES WP 5.0, VP-PLANNER AND DBASE III. CONTACT CARL SCHWIMMER OR BILL CONE AT (602) 523-3657 FOR FURTHER DETAILS

OHIO ST U

MARJORIE BRUNDAGE
DIRECTOR OF COMPUTING SERVICES
(614) 292-1741
MUB@OHSTMUSA.BITNET

95% OF ALL USERS ARE CONNECTED TO THE CAMPUS-WIDE AREA NETWORK WHICH ALLOWS ACCESS TO ALL CAMPUS COMPUTER FACILITIES.
1988-89: A MICROLAB UNIT FOR RESEARCH NEEDS OF FACULTY AND PH.D. (GIVEN SCHEDULING PRIORITY) (18 NETWORKED PC'S).

PURDUE U (KRANNERT)

SURESH L. KONDA
DIRECTOR OF KRANNERT COMPUTING
(317) 494-4513
KONDA@MIDAS.MGMT.PURDUE.EDU

KRANNERT HAS DEVELOPED AN ELECTRONIC MAIL PACKAGE (ALLOWING FOR TRANSFERS OF ARBITRARY FILES) THAT RUNS IN A MULTIVENDOR ENVIRONMENT. IT SUPPORTS NETWORK WIRING SCHEMES THAT INCLUDE TOKENRING, ETHERNET, AND LOCAL TALK AND THE TCP/IP COMMUNICATION PROTOCOL. POST OFFICE SERVICES ARE SUPPLIED BY UNIX BASED SERVERS THAT SUPPORT TCP/IP.

U OF ROCHESTER (SIMON)

RICHARD E. WEST
ASSOCIATE DEAN
(716) 275-4408

DIGITIZED PHOTO STUDENT I.D. DATA BASE.
KEVIN BRENNAN (716) 275-4409.

ROLLINS COLLEGE (CRUMMER)

MARTIN SCHATZ
DEAN
(407) 646-2249

ALL STUDENTS HAVE LAPTOP COMPUTERS.
ALL CLASSROOMS HAVE POWER SOURCE ON DESKS TO PLUG-IN LAPTOP COMP.
ALL CLASSROOMS HAVE COMPUTER PROJECTION SYSTEMS.
ALL EXAMS ARE OPEN BOOK, OPEN NOTES, OPEN COMPUTER.

RUTGERS U

RAJU SHAH
MANAGER, COMPUTER SERVICES
(201) 648-1284
RSHAH@DRACO

ELECTRONIC CLASSROOM.

SOUTHERN ILLINOIS U, EDWARDSVILLE

ROBERT CARVER JR.
ASSOCIATE DEAN
(618) 692-3412

A COMPUTERIZED CLASSROOM.

SOUTHERN METHODIST U

SHARON L. CRISWELL
DIRECTOR, BUSINESS INFO CENTER
(214) 692-2590

OUR SCHOOL INTEGRATES THE INFORMATION SOURCES (CCD-ROM AND ONLINE) RIGHT INTO THE MICROLAB & THE TECHNOLOGY (ON FLOPPY DISKS OR OVER THE LAN) CAN MOVE THIS ELECTRONIC INFORMATION DIRECTLY INTO APPLICATIONS (I.E., LOTUS, EXCEL, WORD & WP) FOR USE WITHOUT REKEYING ON OUR 30+ PC'S.

SUFFOLK U

NANCY CLEMENS CROLL
DIRECTOR - ACADEMIC COMPUTING
(617) 573-8659
CROLL@SUFFOLK

OUR CURRENT INNOVATIONS:
1. OVER 100 MICROCOMPUTERS WHICH WILL EVENTUALLY ALL BE NETWORKED TO NOVELL NETWARE BASED FILE SERVERS, W/ A GATEWAY TO THE PRIME.
2. HEAVY USE OF THE CD-ROM BASED COMPUTSTAT DATABASE.
3. ALL STAFF AND FACULTY HARDWIRED TO THE PRIME 6350 ACADEMIC COMP SYSTEM.
4. ALL STUD HAVE A USER ACCOUNT AND ACCESS TO THE UNIV-WIDE ELECTRONIC MAIL SYSTEM.
5. FREE ACCESS TO WORDPERFECT.
6.THE ONLY UNIV-BASED BETA TEST SITE FOR NOVELL RUNNING ON PRIME

TULANE U

RAYMOND P. JEAN
DIRECTOR--TECHNICAL SERVICES
(504) 865-5670
GB1CBTS@TCSVM

OUR CUURENT INNOVATIONS:
1. CLASSROOM PRESENTATION SYSTEM: (IN 5 CLASSROOMS) BARCO600 IS USED AS A PROJECTOR & A MOVABLE WOODEN CONSOLE CONTAINS A 286 PC, VIDEO SLIDE PROJECTOR, ELMO VISUAL PRESENTER, & SUPER VHS VCR. THE COMP/PROJECTOR ARE VGA-CAPABLE.ALL ROOMS CONNCETED BY VIDEO CABLE TO EACH OTHER AND TO A SEPARATE STUDIO. ROOMS EQUIP W/ STERIO SOUND. 2. VIDEO MSG SYS/COMP GRAPHICS DEVELOP A COMP-BASED SLIDE SHOW CREATED & THEN CONVERTED FROM VGA TO NTSC SIGNAL FOR DELIVERY ON A STD TV SET ON DISPLAY IN OUR ATRIUM. SUP EQUIP INCLUDES A GRAPHICS SCANNER,DIGITIZING PAD,VIDEO DIGITIZER,ETC.

UTAH STATE U

LLOYD W. BARTHOLOME
HEAD, BUS INFO SYSTEMS & EDUCATION DEPT
(801) 750-2342
LBART@USU

WE USE EXCELERATO-AS A CASE TOOL. WE ALSO HAVE HANDS-ON TEACHING LABS W/ OVERHEAD MONITORS FOR DEMONSTRATING. THE MOST UNIQUE ASPECT OF OUR PGM IS THAT WHEN THE LEGISLATION DID NOT COME THROUGH W/ FUNDS TO PURCHASE MICROCOMPUTERS, THE STUDENTS VOLUNTEERED TO HAVE A $2/CT HR SURCHARGE LEVIED AGAINST THEM FOR PURCHASES & OPERATION OF 300 PC'S ACROSS CAMPUS. THE PGM WORKS WELL!

VANDERBILT U (OWEN)

JOE BLACKBUM
ASSOCIATE DEAN
(615) 322-2219
BLACKBJ1@VUCTRVAX

1. USE OF GRAPHICS IN SYSTEM DESIGN
B. GAVISH (615) 322-3659
2. USE OF TELECOMMUNICATION FOR GLOBAL COMPETITION.

U OF VERMONT

JAMES M. KRAUSHAAR
ASSOC PROFESSOR
(802) 656-0498
JKRAUSHA@UVMVM

WE HAVE A SMALL NEW MIS EXPERIMENTAL LAB WITH 1 IBM TOKEN RING, 4 PS/2 (30,555X'S, 70) & 3 ZENITH 386'S. IT IS FOR EVALUATION & DEVELOPMENT OF SYSTEMS BY FACULTY/STUD IN BUS. IBM CORP, MICROSOFT CORP, AND A UNIV PATRON MADE THE LAB A REALITY.

U OF VIRGINIA (DARDEN)

GEORGE WILLIAMS
DIRECTOR OF COMPUTING SERVICES
(804) 924-3215
GFWGS@VIRGINIA

USE OF LOTUS ONE-SOURCE DATA BASE OVER NOVELL LAN TO PROVIDE NETWORK ACCESS TO FINANCIAL DATA FOR INSTRUCTION AND RESEARCH.

WASHINGTON U (OLIN)

CHARLEY FUCHS
ASST DEAN
(314) 889-5144
FUCHS@WUOLIN

TAYLOR LAB-COMPUTER LAB FOR EXPERIMENTAL ECONOMICS RESEARCH.
CONTACT: DON COURSEY (314) 889-6328.

QUEEN'S U, KINGSTON

JOHN MCKIRDY
(613) 545-2365
MCKIRDY@QUCON.BITNET

QUEEN'S EXCLUSIVE DECISION CENTER (FORMERLY THE DECISION LAB IN PREVIOUS REPORTS): 6 XT CLONES NETWORKED WITH COMPAQ 286, WITH PROJECTION SYSTEM, ETC., IN AN ENVIRONMENT TO SUPPORT GROUP DECISION MAKING.
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WE ARE IN THE PROCESS OF REMOVING ALL OF OUR ADMINISTRATIVE SYSTEMS FROM OUR MAINFRAME AND REPROGRAMMING THEM ALL IN DBASE IV.