

# All About Time-Sharing and Remote Computing Services

Timesharing and remote computing services are now available for virtually any data processing application that could otherwise be performed by an in-house data center. The marketplace provides the broadest range of services imaginable, from raw batch processing to highly sophisticated specialty applications packages. And, if the application you need is not already on the market, technically knowledgeable RCS field personnel are ready and willing to help you develop it.

There are two key concepts to keep in mind when examining the RCS industry. The first key is *service*. Today's remote computing company supplies much more than computing power; it is a service-oriented organization that provides all the "hand-holding" necessary to get your applications—whatever they may be—up and running. The services available vary considerably from vendor to vendor, but may include training your staff, furnishing hardware, developing software, and providing other DP-related consulting or professional services in your specialty area.

As you might expect, some of these value-added services are offered for an additional charge. But, unlike consulting firms, for example, whose profit structure is based on their human resources, and whose charges are based on hourly rates for the "people-time" the client uses, a good many RCS vendors simply write off at least some of the field services they perform as overhead against the day that your application begins eating up all the System Resource Units (SRUs), connect time and CPU seconds, or whatever computer charge unit they use to bill you. In fact, the RCS vendor has a vested interest in providing a reasonable amount of timely, high-quality service for "free" to the end user, since it promotes both faster cut-over to the RCS system and a healthy relationship with the customer, who can then be considered a prospect for additional services.

The second key is *specialization*. Most RCS vendors do not attempt to provide services in every possible applications area. Instead, each generally selects a "target market" (or several targets, depending on the size of the company) in which to specialize. The company then concentrates its resources in the chosen application(s), building a solid library of programs, developing a staff of technically knowledgeable field personnel, and promoting a reputation of expertise in that specialty. The chosen area of expertise may be a "vertical" market that concentrates on serving specific industries, such as retail, manufacturing, insurance, banking, or medical, with a variety of industry-oriented applications, or it may be a "horizontal" market that provides general-purpose packages for specific applications, such as accounting, distribution, or transaction processing, that can be used by a wide range of companies.

In terms of competition, this specialization tends to cluster the RCS vendors who serve the same target

This up-to-date look at the remote computing (timesharing) industry focuses on recent developments and trends in the RCS business. The report also give a brief historical perspective on the industry, discusses user benefits and disadvantages, provides the results of Datapro's latest RCS user survey, and offers a guide for the selection and evaluation of remote computing services. A detailed index of the application programs and user programming aids offered by various vendors is included, as well as 132 comparison charts covering the services available from 115 commercial RCS vendors.

markets. In some cases, even companies whose primary business is not timesharing are entering the RCS arena to compete against established processing firms in their own areas of specialty. For example, General Motors offers remote computing services to their dealers, certain airlines provide timesharing services to other airlines, and some large financial institutions (particularly banks) share their resources with their correspondent banks. Depending on the potential for opportunities in that market, the number of vendors in the cluster may be great or few, but among those vendors, the competition is bound to be fierce. And the winners are generally those companies who have the best program library and the most convincing field staff.

## Recent RCS Newsmakers

The past year has been an active one for the remote computing industry. Beyond the ongoing efforts to upgrade existing software or offer new packages, significant events occurred in several areas.

First, several companies opened new data centers. The most important move was made by McDonnell Douglas (McAuto), whose new \$70 million, seven-building complex in St. Louis opened in March 1981. The data center, housed in a single building, contains 13 IBM 3033 and CDC Cyber 173 and 175 mainframes and related equipment, valued at \$130 million; according to McAuto, this is the largest concentration of computer power under one roof anywhere in the world. McAuto also maintains a second data center of 9 IBM 3033s in Long Beach, California. Together the two centers serve over 16,000 McDonnell Douglas (in-house) and commercial customers.

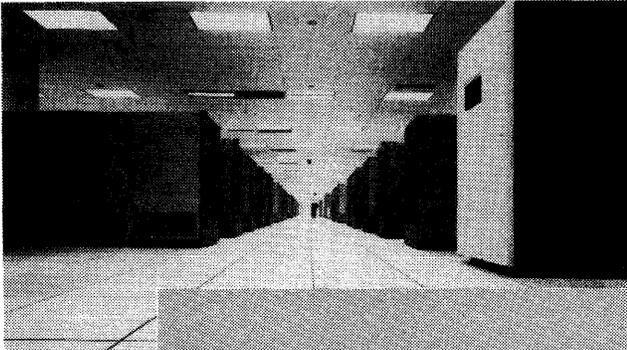
Boeing Computer Services (BCS) also opened a new data center in Kent, Washington and started construction of another at Bellevue, Washington. The Kent facility is primarily for support of in-house Boeing customers, >

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**A rare glimpse at the internal resources within the world's largest data center...**

McAuto's new St. Louis complex, which was announced with full fanfare in March 1981, reportedly contains the largest concentration of computer power under one roof anywhere in the world.

A 450-foot long cavern of IBM and CDC processing units is the heart of the complex.



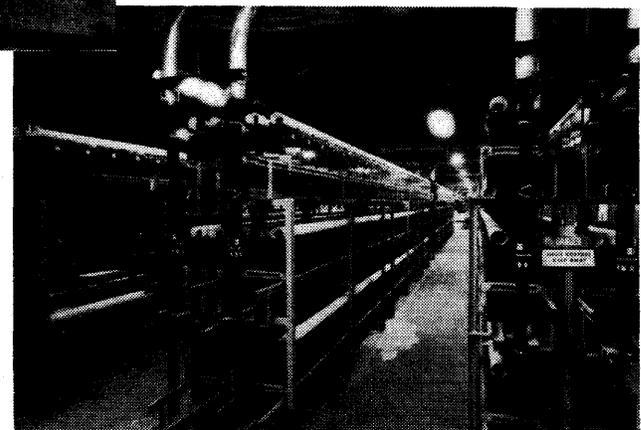
Customer programs are mounted on tape drives in the operations center. McAuto's tape library houses approximately 130,000 reels.



The seven-building complex includes the data center, four office buildings, an energy management building, and a service core housing a cafeteria and auditoriums.



A 24-hour manned control center monitors on-line computer operations.



Providing back-up in the event of a power failure are 3480 two-volt batteries and four diesel generators.

▷ while the Bellevue site will service both commercial and internal Boeing requirements. Other BCS data centers are in operation in Philadelphia, Wichita, and Vienna, Virginia. BCS currently serves over 2000 customers.

Just as in other industries, it is sometimes better to buy out an existing operation and the people-power that goes with it, than to start up a new project from scratch. A number of companies have chosen acquisition as a route towards general growth or as a vehicle for entering a new

target market in the past year. Leading off on the acquisition score-sheet was Tymshare who added at least five new companies to its roster: Microband Corporation of America, a common carrier that operates Pay TV microwave transmission stations; Telecheck Services, a Denver-based check-guarantee service organization; Medistat, a medical claims processing service; Bankcard Association of Rhode Island, a credit card service firm; and Payment and Transfer Service, a check processing company. ▷

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➤ Two major acquisitions were made by Automatic Data Processing (ADP), who added Data Corporation of America, an accounting services firm, and Telephone Computing Services, an electronic telephone bill-paying service company, to its family. Informatics also took the acquisition route, purchasing Professional Software Systems, a software and systems house serving the legal community, and Transportation Computing Services Company, an on-line financial service for taxi and garment industries in new York City. Other acquisitions were made by: McAuto, which bought Improved System Technologies, a company specializing in structured systems development methodologies; National Data Corporation, which acquired Applied Logic/International, a timesharing firm formerly owned by Raytheon; and Sun Information Services, which purchased Metropolitan Computer Center, an RCS company serving the Chicago banking industry.

Of all the RCS firms, Tymshare seems to have been the most venturesome in terms of changing the direction of the industry. For this reason, the Microband acquisition is particularly significant among its acquisitions. Within three weeks of the completion of its purchase in early January 1981, Tymshare indicated that it planned to apply as soon as possible for FCC licensing to offer Digital Termination Service (DTS), a new local distribution scheme for data communications users established by the FCC in the same month. License approval will allow Tymshare, in conjunction with its subsidiary, Tymnet, and its partnership with Satellite Business Systems, to enter new markets that are, as far as we know, as yet untouched by the RCS industry, including electronic mail, videotex, teleconferencing, and other emerging data communications services for both the home and business. An agreement signed in July 1980 with Source Telecomputing, developers of The Source, an up-and-coming videotex-type information service, takes on new significance in light of the local distribution capabilities Tymshare intends to offer. Although the agreement calls for Tymshare to provide computing power and assistance in developing applications software for The Source, we cannot help but believe that a marriage of The Source's information services and Tymshare's distribution capabilities is also being considered.

Another interesting Tymshare venture is its new Option service, which introduced the timesharing concept to automated teller machine (ATM) services in December 1980. Tymshare is the first company in the U.S. to establish and operate a network of ATMs on a third-party basis. Twenty-two financial institutions were charter participants in the network, whose customers can make deposits and withdrawals at any of 11 kiosks in the Los Angeles area, but Tymshare expects rapid growth both in the size of the network and the number of subscriber institutions.

Boeing Computer Services has also made a significant move this year towards providing its customers with up-to-date networking technologies, such as satellite

communications, within the framework of their existing service offerings. In a major announcement in June 1981, Boeing introduced the RCS industry's first full implementation of IBM Systems Network Architecture (SNA), providing a dial-up SDLC capability to users of IBM 3270 and other SNA-compatible equipment. Customers' on-site computers, such as IBM 8100 and 4300 processors, can participate in the network as distributed processing nodes.

If Tymshare's and Boeing's actions can be interpreted as precedent-setting, the direction of the RCS industry is clear. The days of selling simple, raw computing power to remote users are numbered, and those vendors who do not respond to the increasingly sophisticated capabilities available as data communication technologies evolve, will be left behind.

### Industry Directions

It seems clear at this point in the evolution of the RCS industry that direction of the RCS environment is to broaden services beyond traditional timesharing to include a wide range of related offerings. This trend began in 1977 with the Xerox Computer Services' announcement of the availability of an intelligent terminal system that could be placed on the customer's premises to perform various but relatively limited in-house processing functions and to tie into the remote computing service for larger or specialty jobs. Four years later, almost every major RCS makes hardware of one sort or another available to its customers. The type of equipment offered spans the full range from simple data entry stations, specialty terminals (e.g., POS, graphics), remote line printers, and other non-intelligent devices to intelligent workstations, desktop computers, mini-computers, and, in a few cases, full-blown mainframes. Frequently, the equipment is designed or programmed for use with specific applications packages, and provided as a turnkey system. Financial arrangements for these on-site systems vary greatly, but most are available for purchase or lease by the customer.

Another area in which this broadening trend is seen is software development. RCS vendors have found that they can offer software products in a remote environment, and, at an appropriate time, move the application to the customer's in-house system on a licensed basis. This arrangement has advantages to both the customer and the vendor: the customer can try out the software product before buying; the vendor uses the potential arrangement as a selling point to prospective RCS customers, maintains some (though reduced) revenue through license fees when the switch-over occurs, and retains the customer as an active prospect for additional services. Some RCS vendors have become so successful at selling their software that they are now offering separate packages aimed directly at software customers independently of their RCS business.

A third area in this broadening trend is in the accessibility of specialized databases. Many RCS vendors maintain ➤

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public (e.g., the U.S. census reports, stock transaction reports, etc.) and proprietary databases applicable to their areas of specialty. However, two recent acquisitions may further define the direction of the trend towards combining remote computing with on-line information retrieval, when their on-line database offerings are released: the acquisition of National CSS by Dunn and Bradstreet, which could potentially put Dunn and Bradstreet's corporate credit analyses on-line; and the purchase of Data Resources by McGraw-Hill, which also owns Datapro, Standard and Poor's, Dodge and Sweet's (two construction industry services), Multi-List (a real-estate industry service), and other information services, all of which may be considered as candidates for on-line retrieval applications.

It can hardly be said that RCS vendors are abandoning their traditional services to become systems or software houses or information retrieval services. Instead these related capabilities are expected to become intimately entwined with, and enhance the value of, existing offerings. In any case, the advantage to the customer seems clear—that there exists a wide range of choices and a greater degree of flexibility from which the most appropriate solution to the particular problem at hand can be decided, and that even in cases where the solution calls for a combination of hardware, software, and services, a single vendor may provide the entire answer.

### Industry Leaders

Revenues for commercial remote computing services, including both interactive timesharing and remote batch processing are currently growing at the rate of about 22 percent per year. At last glance, the top 5 contenders appear to be Control Data, Automatic Data Processing (ADP), General Electric, Tymshare, and McDonnell Douglas Automation Company (McAuto). Not one of these companies holds a market share greater than 7 percent, and the five total a *combined* market share of only 26%, leaving plenty of room for other competitors.

Control Data Corporation has led the list since 1973, when it acquired IBM's Service Bureau Company as part of an out-of-court settlement of its antitrust suit against IBM. With SBC's revenues added to those of its own Cybernet service and its specialized Arbitron and Ticketron services, Control Data grossed an estimated \$420 million from revenues in 1979, and ended up with a 7% market share.

ADP consists of two major groups: the Commercial Services Group, which handles accounts payable, accounts receivable, general ledger, and unemployment cost control processing services across major industries; and the Financial Services Group, which performs bank DP services. ADP grossed an estimated \$409 million in 1979.

GE's "Mark III" service combines interactive time-sharing, remote batch processing, and network data

management services that provide rapid access to centralized information files. GE has invested over \$150 million in developing an international network that serves the United States, Canada, and Western Europe. Three GE "super-centers" located in Cleveland, Ohio, Rockville, Maryland, and Amsterdam, The Netherlands contain a total of more than 100 interconnected central processors and communications controllers. GE's RCS operations grossed just under \$300 million in 1979.

Tymshare provides a variety of services for accounting, medical, credit card processing, and manufacturing applications. Its data communications network, Tymnet, is just one of the many value-added services it provides. Tymshare gross revenues in 1979 were \$160 million, of which \$16 million was derived from its Tymnet subsidiary.

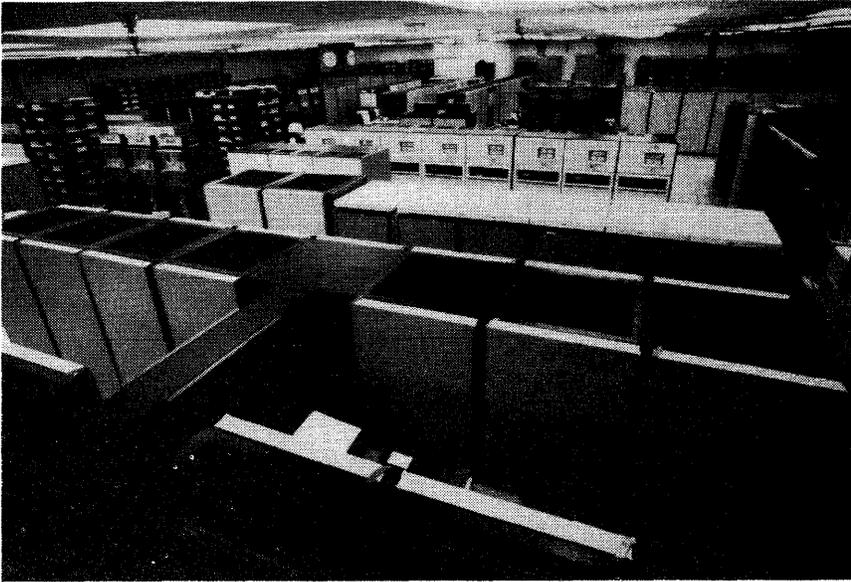
McAuto's major specialties are in the areas of financial and patient care applications for the medical industry, structural, civil, and mechanical design and analysis for the engineering community, and RCS services for the telecommunications industry. Its 1979 RCS revenues totaled approximately \$135 million.

### Remote Computing Background

The earliest remote computing systems were developed in the universities in the early 1960's, with Dartmouth and M.I.T. in the vanguard. The first commercial services were established in 1965. These were interactive time-sharing services designed for scientists and engineers who wanted to use the computer's vast computational power to solve problems. Problems confronting scientists and engineers typically have this in common: they tend to require comparatively little input and output, often involve no files of data, and generally demand large, complex calculations. For these users, the least expensive and slowest computer terminals, such as teletypewriters, suited their purposes quite well. Also, many of the scientists and engineers wanted to program the computers themselves. To meet this need, the timesharing services provided easy-to-use, high-level languages such as BASIC and FORTRAN. Useful programs could be stored for reuse in a library. This type of interactive timesharing is still in widespread use among scientists, engineers, statisticians, and business planners.

Remote computing suppliers soon realized that the potential for predominantly computational applications was far smaller than the market for business data processing services. So just as the computer itself has evolved from its initial role as a gigantic calculator into an everyday business tool, so has timesharing moved into today's business world. Whereas the scientific user typically requires a great deal of computing power and very little input and output data involving almost no files, the business user tends to require the capability for a comparatively large volume of input, maintenance of organized files, formatted output, and just enough computational power to perform a relatively simple process upon the data. ➤

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Xerox Computer Services made news this year when they announced that they plan to replace their aging Sigma 9s with IBM and IBM-compatible equipment, rather than Honeywell's successor to the old Xerox system. Xerox sold its computer manufacturing operations, including the Sigma 9 line, to Honeywell in 1975. After careful study, XCS has decided that the IBM environment lends itself best to the kinds of services XCS provides, and the company hopes to attract new IBM-oriented users. Pictured at the left is one of XCS's four data centers, all of which are located in California.

➤ And just as the programming language is important to the scientific user, the program library is important to the business user. While the former may have wanted to keep a few useful computational routines in the library, the business user absolutely requires a library of processing programs that will ensure that the system is always prepared to operate on and process his current data in an appropriate and uniform fashion. Importantly, if the program library is adequate, the user need not know or care about the programming language; he only has to know how to prepare the data and specify initiation of the desired process. Indeed, most remote computing vendors will create the programs for their users or install into the library "packaged" programs that the users require.

Although the rate of acceptance of remote computing services was slow at first, revenues for general business and administrative applications have gradually overtaken those for scientific and engineering services. And, given the industry predictions, the revenue gap between these two types of services will continue to widen as commercial applications grow.

The growth and continued success of remote computing services can be attributed to several factors. First and foremost is the fact that depending on the amount of actual usage, it is still frequently cheaper to use a small piece of a large computer system than most or all of a small system. Stiff competition in certain applications areas is currently presented by the highly active minicomputer and microcomputer markets, and a significant number of users have found that the economics and performance of these systems can justify doing the job in-house. Other users prefer not to deal with the problems of ownership, and are willing to pay a little more for the peace of mind gained by relying on an outside company to fix whatever goes wrong.

Another incentive for using remote computing is ease of use. The user will typically need only train a terminal operator, and need not be concerned about developing and maintaining a staff of computer operators, programmers, maintenance personnel, etc. Remote computing users have found that it is more cost-effective for a central computing facility like a remote computing company to absorb these costs, and then distribute the computing resources among many users.

It may appear surprising that corporations with extensive in-house computing facilities comprise a large portion of the remote computing customer base. However, a number of circumstances justify the use of timesharing services by these companies. For example, a company's in-house facilities might be devoted to "high-priority" processing (perhaps production management or billing), with little time left for secondary processing functions such as personnel or statistical reporting. It also allows a company to get rid of sticky one-shot problems, or complex but infrequently done jobs that are not worth the time and expense to develop and maintain in-house. A remote computing company can effectively supply the supplementary resources needed to perform these and similar functions.

### User Benefits

Commercial remote computing services offer numerous attractive benefits to their users. Here are some of the principal reasons for using remote computing services:

- *Flexibility.* Remote computing enables you to buy only as much computing power as you need and (except for fixed terminal costs and minimum service charges) to pay only for what you use. Thus, you can effectively "stretch" or "shrink" the size of your computer installation from day to day as your workload expands ➤

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▷ or decreases. You can use a remote computing service to handle the peak-period overloads on your in-house computer system. You can explore the possibilities of centralized data bases and management information systems at comparatively low costs and without any long-term commitments. What's more, you can deal simultaneously with two or more remote computing companies and take advantage of differences in their pricing structures, languages, and program libraries.

- *Ease of use.* In general, remote computing terminals are straightforward in operation and easy to learn and use. Programming languages such as BASIC, together with conversational-mode compilers and debugging aids, have made programming quite simple and fun to learn. The comparative simplicity of the terminals and their ease of operation have made interactive time-sharing an accepted mode of operation for numerous engineers and accountants.
- *Man/machine interaction.* Interactive timesharing permits direct, instantaneous communication between humans and computers at affordable prices. Users can test and debug their programs as they write them, with the computer checking, guiding, and reassuring them at each step in the process. A similar dialog process between user and computer can greatly facilitate the solution of many engineering and scientific problems, and can provide managers with exactly the information they need for informed decision-making.
- *Fast turn-around.* The remote computing user can simply sit down at his or her terminal, enter the data, initiate execution of the appropriate program, and get the results needed, either at the terminal or on a suitable output device at the computer site, all with a minimum of delay.
- *Choice of languages.* Most remote computing suppliers offer a choice of several programming languages, making it quite feasible for each user within your organization to work with the language that best suits his or her own background and the problem at hand.
- *Application programs.* Most of the commercial remote computing companies are placing an ever-increasing emphasis upon the development of ready-made programs for specific applications. The availability of suitable application programs can save you thousands of dollars in programming costs and get you "on the air" much sooner.
- *Networks and data bases.* A number of companies now offer nationwide communications networks that permit users scattered around the country to access a centralized data base. These services can permit your company to enjoy most of the advantages of a wide-spread on-line communications network with cen-

tralized files at a fraction of the cost of setting up and operating your own. (It should be noted, however, that considerations of communications reliability, access control, file security, and flexibility of the available data manipulation and retrieval languages become particularly important in this type of application.)

- *Specialized expertise.* Dozens of companies are now offering remote computing systems dedicated to providing a specific type of service. Examples include dedicated systems for hospital accounting, automobile dealer accounting, text editing, and civil engineering computations.

### Possible Drawbacks

Despite the many advantages, remote computing can be a mixed blessing. Here are some aspects of remote computing that could potentially present problems:

- *Reliability.* This question should be uppermost in the minds of prospective remote computing users: Just how reliable is the service? Overall, the reliability of the existing remote computing services is more than adequate for most applications of the computational variety. Most system "crashes" that occur nowadays are of short duration and are quickly followed by effective recovery procedures that minimize their impact upon users' operations. But companies contemplating the use of remote computing for business data processing, where important files must be stored and processed on a timely basis with minimal errors, should pay careful attention to the reliability aspect.
  - *Computational efficiency.* The complex software required to coordinate and control the operations of multi-user interactive timesharing systems usually requires large amounts of central processor time and memory space. And, since the customer charges are generally based on computer resources used, the vendor often has no vested interest in improving the efficiency of the software, unless it becomes so severe that it affects the company's ability to compete in the marketplace. As a result, the computational efficiency of many of the current systems is very low. From the user's point of view, this poor efficiency may or may not be a matter of concern, depending upon the manner in which the central processor costs are allocated. Low computational efficiency is less likely to be a problem in remote batch processing systems because their control software requirements are less complex.
  - *Data security.* When multiple users share a computer system, challenging problems are encountered in safeguarding the confidentiality and integrity of each user's programs and data files. Most of the commercial remote computing services have paid a good deal of attention to this security problem, combining special access protection with passwords and a variety of other
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responses. Forty different RCS companies were represented by these responses. Only two vendors, the Service Bureau Company and General Electric, received more than ten responses each.

Although these users provided vendor ratings as a part of their responses, we have decided, after much deliberation, that it would be inappropriate to publish our traditional user rating table this year, since the number of responses for any one vendor, or in total, represents such a small percentage of the RCS user base.

We have decided, however, to print our normal summary of users' responses to our questions about their usage of remote computing services, since these summaries present only a generalized profile of usage and are therefore less subject to misinterpretation.

The first series of questions pertained to the user's company size, the amount of in-house processing performed, the near-term future plans for using remote computing services, and the relative importance of a series of considerations. These questions form a picture of the users responding to the questionnaire.

The users who responded can be grouped according to company size as follows:

	Users Responding	
	Number	Percent
Annual revenue:		
Less than \$5 million	13	24
Between \$5 million and \$50 million	4	8
Between \$50 million and \$100 million	8	15
Between \$100 million and \$500 million	17	32
Over \$500 million	11	21
Total number of users responding	53	100

The next question asked about the extent of in-house computing facilities, with the following result:

	Users Responding	
	Number	Percent
No in-house facilities	5	9
Some in-house facilities	24	42
Extensive in-house facilities	28	49
Total number of users responding	57	100

Clearly, remote computing services were being used to supplement rather than replace in-house computation by most of the Datapro subscribers who responded.

The next question was intended to elicit a qualitative measure of the users' plans regarding remote computing service growth by asking directly if the user planned to increase or decrease usage, planned no change, planned to move some applications in-house, or planned to move all applications in-house. The responses are summarized below:

Users Responding

	Number	Percent
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Remote computing service plans:		
Planned no change	15	36
Planned an increase	18	43
Planned a decrease	9	21
Total number of users responding	42	100

In-house plans:		
Planned to move some applications in-house	16	38
Planned to move all applications in-house	7	17
Total number of users responding	23	55

In the above tables, the first question was completely definitive; therefore, the actual number of users responding was used as the base for calculating the percentages. In effect, we assumed that the users who did not answer the question matched the pattern of those who did. The second question is not definitive; no answer was elicited from those users not planning to bring any applications in-house. Therefore, an approximation was made by using the same number of responses as in the previous question as the base for percentages.

The next question attempted to identify important considerations in selecting a remote computing service. A list of eight considerations was presented with the request for the user to arrange the list in numerical order of importance. The following table summarizes the results:

Criteria	Weighted Importance*
Most important	
• Cost	3.0
• Accessibility	3.2
• Application packages	3.5
• Response time	4.0
• Technical support	4.2
• Data security	5.1
• Control procedures	5.7
Least important	
• Proprietary data files	6.2

\*Calculated on a scale of 1 to 8 by assigning a numerical value of 1.0 to most important, 2.0 to next most important, and so on. Totals were then divided by the number of responses per criteria.

It is interesting to note that most users considered cost and accessibility of highest importance in their evaluation of a remote computing service, and the applications available from the service vendor, and the response time with which their information needs are met, of secondary importance. The fact that applications availability ranks above technical support might very well be interpreted as meaning that most of these respondents rely on the programming expertise of the remote computing service, rather than assume the expense of developing their own tailored applications.

The ranking of data security, control procedures, and proprietary data files as relatively unimportant might be explained in several ways. First of all, many users might be performing processing functions involving 'sensitive' ▷

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➤ data in-house, as most of the users indicated they also had extensive in-house facilities. Alternately, many of the users might be quite satisfied with the security and control measures offered by the remote service. It may, in fact, offer more security than if such files were kept in-house.

The remainder of the questionnaire was devoted to questions about the usage of the specific services to which these users subscribe.

One question dealt with the length of time the user had been utilizing the service. A summary for all services is presented below:

	User Responses	
	<u>Number</u>	<u>Percent</u>
Length of time service used:		
Less than 6 months	6	7
Between 6 months and 2 years	21	26
Between 2 years and 5 years	30	37
Over 5 years	24	30
Total number of user responses	81	100

Clearly, the survey included mostly seasoned users of remote computing services.

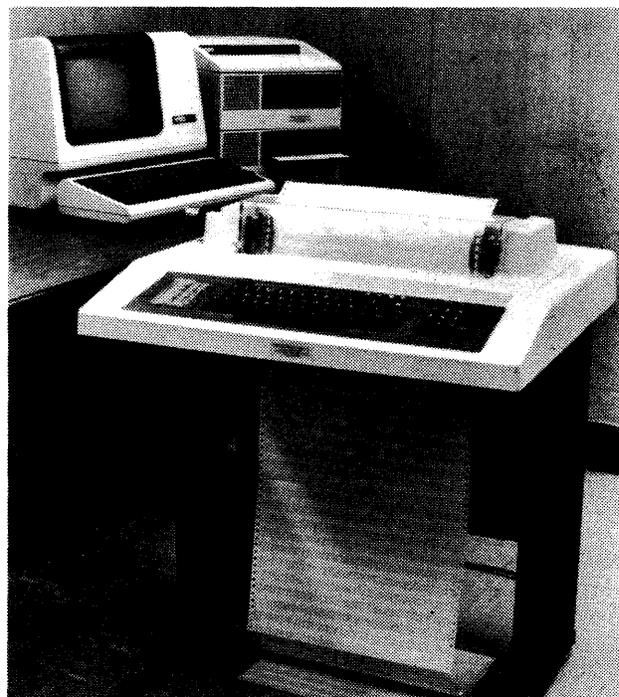
Another question asked about the applications for remote computing services, with the following results:

	User Responses	
	<u>Number</u>	<u>Percent</u>
Financial Planning/Budgeting	37	43
Engineering	33	38
Accounting	24	28
Sales/Marketing	22	25
Research and Development	12	14
Manufacturing	9	10
Personnel	7	8
Distribution	6	7
Insurance/Actuarial	5	6
Other	8	9

The total number of user responses (87) was used as the basis for calculating the above percentages. Obviously, many users reported multiple applications. The results make it clear that remote computing services are now being used more extensively for business data processing applications than the traditional engineering/scientific calculations.

Instead of trying to determine the specific brand names of the terminals being used in connection with the remote computing services, we elected to ask about terminal characteristics. The results are summarized below:

	User Responses	
	<u>Number</u>	<u>Percent</u>
Terminal characteristics:		
Interactive	71	82
Character printer	60	69
CRT	39	45
Batch	30	34
Line printer	22	25
Programmable	11	13



Among the many companies currently offering intelligent workstations to be placed at the customer's site is Genesee Computer Center. Genesee's NDS system is based on a DEC PDT-11/150, which is warranted and maintained by DEC. Genesee provides a variety of special programs for the system, such as an optical design package and a library of data entry descriptor files, that complement Genesee's remote program offerings.

Again, the total number of user responses (87) was used as the base for calculating percentages. While the overall numbers may be a little low because a few users did not answer this question, the pattern is quite clear. Nearly everybody uses interactive terminals, almost half of which are CRT units. Printers are clearly required by the vast majority of users, and many users employ high-performance batch terminals and line printers. Programmable devices have not yet made as much impact as they undoubtedly will in the future.

While on the subject of terminals, we naturally asked the traditional question about how many terminals were being used. The results showed two distinct groups of users: those with a lot of terminals and those with just one or a few terminals. The results are summarized below:

	User Responses	
	<u>Number</u>	<u>Percent</u>
Users with 1 terminal	18	23
Users with 2 terminals	22	29
Users with 3 terminals	9	12
Subtotal	49	64
Users with 4 or 5 terminals	9	12
Users with from 6 to 9 terminals	6	8
Users with from 10 to 15 terminals	7	9
Users with from 16 to 50 terminals	4	5
Users with more than 50 terminals	1	1
Total number of user responses	76	100

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➤ Almost one-quarter of the respondents had only a single terminal accessing the remote service, and almost two-thirds has three or less. Less than one user in ten had over 15. With this in mind, we can readily see that the average number of terminals per user, 6.5, can be misleading.

One question asked the users to identify the method of accessing the remote computing service. The summary below confirms the expected dominance of the public telephone network, but other methods are also being used:

	User Responses	
	Number	Percent
Access method:		
Dial-up (DDD)	73	84
Leased voice-grade line	12	14
DDS (AT&T digital service)	2	2
Packet switched service	2	2

The percentages are based on a total number of 87 user responses.

The next two questions explored the subject of monthly expenditures. Users were asked to check appropriate boxes which indicated monthly cost ranges for total vendor bill and terminal cost. These figures should be used only qualitatively. The results are presented below:

	User Responses	
	Number	Percent
Total remote computing vendor bill:		
Under \$500/mo.	19	23
Between \$500 and \$2,000/mo.	20	25
Between \$2,000 and \$5,000/mo.	19	23
Between \$5,000 and \$10,000/mo.	10	12
Over \$10,000/mo.	14	17
Total number of user responses	82	100
Terminal cost:		
Under \$500/mo.	44	56
Between \$500 and \$2,000/mo.	19	24
Between \$2,000 and \$5,000/mo.	10	13
Over \$5,000/mo.	3	4
None	2	3
Total number of user responses	78	100

The "None" category under terminal costs accommodates those cases where line costs and/or terminal costs are included as part of a service arrangement. These areas of cost were intended to be independent; i.e., terminal connect time would be included under the vendor bill. From the pattern of responses, it appears that our subscribers generally interpreted the questions as intended. Nonetheless, we urge you not to draw hard-and-fast conclusions from the above information. Used as a source of qualitative indicators, with other material in this section, it can provide indications but not definitive answers.

Clearly, there is no "average" cost of using a remote computing service, at least based on these responses. The

monthly costs reported were greatly dispersed, ranging from several hundred dollars to well over \$5,000. It is noteworthy, however, that the majority of respondents were spending less than \$500 per month for terminal costs. This appears consistent with the fact that most users have only one or two terminals in use with the remote service.

A final question asked users whether the user maintains a data base on the remote computing system. The results are as follows:

	User Responses	
	Number	Percent
Vendor-maintained data bases:		
No	37	47
Yes	42	53
Total number of user responses	79	100

Only about half of these users are using remote computing to maintain a data base. Inasmuch as the majority of the respondents indicated extensive in-house computing facilities, it might be assumed that many are maintaining their own data base files. It is also possible that many of the users move portions of their data bases to the remote service in batch mode only as needed for a specific job. Many scientific/engineering applications may also not require maintenance of a data base.

### Selecting a Vendor

In most metropolitan areas of the United States and Canada, prospective remote computing users can choose from literally dozens of suppliers. Selecting the company that will provide you with the most effective service at the lowest overall cost isn't easy, but it can be done. What's needed is a straightforward, logical selection process that will guide you around the numerous pitfalls which await the unwary. The following procedure, if judiciously applied, will virtually assure the satisfaction of your remote computing requirements in a reliable, economical manner.

1. *Define your requirements.* Before shopping for remote computing services, it's essential to know what you want them to do for you. Try to list all the reasonable applications for remote computing in your organization. Then rank these applications according to their relative importance and urgency. For each of the key applications, define the required computer functions—usually in terms of the inputs to be supplied, the calculations to be performed, the outputs to be produced, and their associated volumes. Specify the exact manner in which all computer inputs and outputs must interface with your existing procedures, forms, and/or data files, as well as any turn-around time requirements that must be met. Finally, determine the present overall cost of processing each application, so that you'll be in a position to know whether or not remote computing can really save you money. ➤

## All About Time-Sharing and Remote Computing Services

- ▷ 2. *Survey the available remote computing services.* The first step in narrowing down the field is to find out which remote computing companies are actively marketing their services in your locality and collect the basic information about their capabilities, specialties, and pricing. The comparison charts in this report can help a lot. So can the Yellow Pages of your local telephone directory. The sales representatives for the various remote computing companies will usually be more than pleased to give you brief presentations describing their firms' capabilities and to present you with brochures, price schedules, and sample contract forms.
3. *Choose the most likely candidates.* Now it's time to reduce the list of contenders to the three to six that seem best able to meet your requirements. You simply eliminate from consideration those suppliers that fail to measure up to one or more critical questions such as these:
- Are the company's services available in your area at a competitive cost (including all communication and terminal costs)?
  - Does the company offer the programming and technical support services you need?
  - Does the company offer the specific programming languages and/or application programs you need?
  - Does the company support the type of terminal equipment you need (or already own)?
  - Can the company satisfy the requirements, if any, for compatibility with your existing programs and/or data files?
  - Does the company appear to be able to meet your requirements for operational reliability and data security?
  - Are you satisfied that the company is soundly financed and in the business to stay?
4. *Learn all you can about each remaining candidate.* Now it's time to call in the sales representatives of each of the remaining contenders for in-depth discussions about their capabilities, services, and pricing. By now you'll have a good idea what questions to ask them—and what answers you're looking for. Be sure to find out exactly what each company offers in the way of equipment configuration, program library, programming services, training, documentation, security measures, contract terms, etc. Get the details of each company's pricing structure, including possible "extra" charges for programming, training, manuals, application programs, and other products and services you'll need. Be sure to ask for reference lists of current users. Contact these users, and learn all you can about what their experiences have been; it's likely to be a remarkably informative exercise.
5. *Conduct benchmark tests.* This is probably the most important—and yet the most frequently ignored or misguided—phase of any remote computing selection project. The essence of benchmark testing is the actual preparation and execution of one or more problems which are representative of the user's planned computer workload. The purpose is three-fold:
- To find out exactly what's involved in using each supplier's services.
  - To determine the service availability, response time, and anticipated throughput that each supplier can deliver at both peak hours (usually around 10 or 11 a.m. and 3 to 4 p.m.) and off-peak times.
  - To determine the cost factors for each service on the types of problems you'll be running regularly.
- If you'll be writing your own programs, go ahead and prepare one or more of them, in the language of your choice. Then ask each of the prospective suppliers to loan you an appropriate terminal plus the computer time required to compile, test, and execute your programs. If you'll be using a ready-made application program supplied by the vendor, prepare some representative test data, borrow the necessary terminal, and give the program a real tryout. In either case, be sure to: (1) control all test conditions as carefully as you can; (2) make the benchmark programs and data as representative of your actual workload as time permits; (3) run each test at both peak and off-peak hours (and at the same times of day for all prospective suppliers); and (4) keep detailed records of all pertinent timing and cost data, as well as your impressions about the comparative ease or difficulty of using each service.
6. *Make your selection.* By now, you've amassed a great deal of pertinent information. Now it's time to "put it all together." From the results of your benchmark tests, calculate the estimated overall costs of satisfying all your remote computing needs with each supplier's services. Compare these costs with your present costs, and (if appropriate) with the estimated costs of alternative approaches such as a computer of your own or a conventional service bureau. In many cases, one of the remote computing suppliers will now stand out as a clear-cut choice. In others, it may be practical to contract with two or more suppliers and use the one whose offerings turn out to be the most economical for each of your applications.
- If neither of the above solutions is appropriate, you may want to turn to some type of weighted point scoring system, in which each supplier is awarded an appropriate number of points for every desirable characteristic (such as availability, response time, languages, terminals, application programs, costs, etc.). But frankly, if it still looks like a really close race, we'd recommend giving preference to the company ▷

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▷ that made the best showing on your benchmark tests; there's no more convincing evidence than impressive performance on your own problems.

7. *Negotiate a suitable contract.* At this point, virtually every remote computing company will ask you to sign its standard contract form. But that's not necessarily your best move. There's a good chance the supplier will offer considerably more favorable contract terms if that's what it takes to land your account. So read the contract carefully. Make sure it clearly defines the company's pricing structure, charges for all additional products and services, hours of service availability, length of commitment, termination provisions, etc. If the supplier writes any programs for you, make sure it's clear whose property they will be. If you're not completely satisfied with the standard contract terms, ask the supplier to amend them.

You'll notice that most of the standard contracts disclaim any liability for damages arising either from the use of the suppliers' services or their failure to provide the agreed-upon services. If you feel you need more protection, such as guaranteed file security, it certainly can't hurt to ask for it. Discussions with other customers of the service may be especially helpful in this area. And the advice of your company's lawyer is likely to be well worth having to help ensure that you'll get the services and the protection you need.

8. *Make periodic re-evaluations.* Once you've selected the most suitable remote computing service for your needs, it's unwise to assume that it will *continue* to represent your best choice. As a remote computing network becomes more heavily loaded, its performance tends to degrade. As the network's saturation point is approached, the response times to each user's requests are likely to become unbearably long. In addition to user frustration, this condition leads to longer connect times and higher costs. Therefore it's wise to rerun your benchmark problems every month or two under the original test conditions. This will enable you to spot any deterioration in the service and present your supplier with documentary evidence of the fact. If the supplier cannot satisfy you that the original quality of service will soon be restored, remember that numerous other suppliers are anxious for your business. And, if you've written your own programs and used one of the common programming languages, it should be relatively easy to make the switch.

### The Comparison Charts

Comparative characteristics of 132 services from 115 vendors are presented in the following section. All information in the following charts was furnished by the suppliers between May and June 1981. Their responsiveness and cooperation with the Datapro staff is greatly appreciated.

Datapro sent repeated requests for information to companies known or believed to be in the remote computing business. The usable responses summarized in our charts represent a comprehensive cross-section of the currently available commercial remote computing services in the U.S. and Canada. *The absence of any specific company from our charts means that the company either failed to respond to our repeated information requests or was unknown to us.*

The comparison chart entries and their significance to potential remote computing users are explained in the following paragraphs, together with additional useful guidelines for selecting the remote computing service that will most effectively meet your needs.

### General Information

*Name of service.* The name under which a company's commercial remote computing services are marketed may or may not be the same as the corporate name. Where they differ, this entry indicates the name of the remote computing service. Some suppliers offer several different levels of service with different names and capabilities, and in these cases there are separate chart entries for each of the separately-defined services.

*Date operational.* This entry tells when the specified remote computing services first became available for regular commercial use. Most remote computing networks require lengthy shakedown periods before settling down to normal operations, so the length of time a service has been operational may serve as a reasonable indication of its reliability—as well as its financial stability. But it is also important to note that few remote computing networks remain really stable for long periods of time; disruptions can occur at any time through addition or consolidation of computer centers, changes in systems software, communications breakdowns, etc.

*Areas currently served.* Each remote computing company was asked to state the geographical areas it can service effectively, and their answers are reported in the charts. Where specific cities are named, the companies generally offer toll-free service in those cities through local computer centers, communications multiplexers, or foreign exchange facilities.

Where a company professes to serve a large region (such as "Entire U.S.," the implication is that the company either offers INWATS (Inward Wide Area Telephone Service) or maintains computer centers, multiplexers, or other toll-free entry points in strategic cities throughout the area. More recently, an increasing number of services are offering access via one of the packet-switched common carriers, such as Telenet or Tymnet. This cost is, in some cases, included in the service charge. Unfortunately, this is not true in all cases. It's wise to contact all the companies whose services appear to meet your needs, and find out exactly what communications and computational facilities they offer in your area. ▷

## All About Time-Sharing and Remote Computing Services

### ▷ Equipment

**Computers.** This entry describes the number and type of central processors that each company currently employs in its remote computing network. The cities in which the computers are located are also indicated in most cases. The smaller supporting computers which are frequently used as communications processors or remote multiplexers are not listed here because of space limitations.

Space limitations have also precluded the reporting of configuration details such as main storage capacity, type and capacity of mass storage units, number and speed of central-site peripheral devices, etc. These configuration details may or may not be significant, depending upon your applications. Conventional scientific applications are typically coded in FORTRAN or BASIC, require little or no permanent file storage, and can be run without difficulty on most of the commercial remote computing systems. Conversely, many business data processing applications impose special requirements for mass storage units, central-site peripheral equipment, and compatibility with existing programs and data files. In these cases, it will be necessary to contact the remote computing vendors for details about their equipment configurations and capabilities.

**Maximum number of simultaneous users.** This entry indicates the maximum number of users at remote terminals that each remote computing company claims to be able to serve simultaneously. This figure can serve as a useful—though far from precise—indication of the power of a remote computing system. The response time to each user's requests will naturally tend to increase as the number of simultaneous users gets larger, and in many cases an attempt to serve the indicated number of simultaneous users will lead to response times which are far too long for effective conversational-mode use.

**Conversational terminals supported.** Currently available remote computing services can be broadly classified as either interactive timesharing or remote batch processing services. Many companies now provide both types of services, and distinctions between them are frequently blurred. In general, an *interactive timesharing system* can be defined as a computer system that enables multiple users to gain simultaneous access to its facilities and to interact with the system in a conversational mode. A *remote batch processing system* can be defined as a system that enables users at remote locations to enter data, initiate the batch-mode execution of programs, and receive the resulting output data. Ideally, either type of system should give each user the impression that all the computational, storage, input/output, and software resources he needs are continuously at his disposal, while keeping him unaware of the fact that he is actually competing with many other customers for the use of these resources.

The specific remote terminals that each remote computing system can accommodate for interactive, conversational-mode operations are listed in this entry.

By far, the most widely used timesharing terminals are the ASCII-based displays and teleprinters. The original, and most prolific, terminals in this category are the old Teletype Model 33 and 35 teleprinters. These units feature conventional typewriter-style keyboards, full-character impact printers, and ASCII code transmission at a speed of 110 bits per second.

The TTY 33/35 offerings were the beginning of what is now a highly competitive ASCII-based, or "TTY-compatible" market, which provides a wide range of teleprinters, CRTs, and other terminals from numerous equipment manufacturers. These devices share a common set of communications interface characteristics and can utilize the same host software, but generally provide enhanced capabilities when compared to the TTY 33/35, such as higher transmission speed, better quality printing technique (or CRT display in place of printing), and improved functionality. Among the more popular teleprinters in this category are the GE TermiNet family, Texas Instrument's Silent 700 and Omni 800 Series, and Digital Equipment's DECwriters. The more prevalent ASCII-based CRT display terminals include the Hazeltine 1400 and 1500 series, the ADDS Consul and Regent series, the Beehive display line, and the Lear Siegler ADM series. In general, any Teletype-compatible terminal can be connected to any remote computing network that supports the Teletype Model 33 or 35 Teletypewriters—but it will generally not be possible to take advantage of the replacement terminal's higher speed and/or improved functional capabilities unless the remote computing company makes suitable modifications in its equipment and supporting software.

The IBM 2741 is another widely supported conversational-mode terminal. Built around an IBM Selectric Typewriter, it provides keyboard input and typed output in both upper and lower case. Its rated transmission speed is 134.5 bits (14.8 characters) per second. The 2741, however, cannot be equipped with paper tape I/O or any other medium for local storage of programs or data. Typewriter-style terminals that are compatible with the IBM 2741 are marketed by Anderson Jacobson, Computer Transceiver, and several other companies.

An increasing number of timesharing vendors are also providing support for the IBM 3270 family of interactive terminals. These terminals include numerous models of stand-alone or clustered configurations, and communicate with the remote service via synchronous communications. The 3270 can therefore provide higher-speed communications and quicker response time than with the asynchronous conversational terminals previously described.

**Batch terminals supported.** In addition to the conversational-mode terminals which are usually associated with timesharing, many of the remote computing networks also support terminals designed for batch-mode transmission and reception of comparatively large volumes of data. Batch terminals greatly extend the ▷

## All About Time-Sharing and Remote Computing Services

▷ spectrum of practical applications for remote computing systems by permitting the entry of previously recorded data and the printing of results at comparatively high speeds.

The most widely supported batch terminal has long been the IBM 2780/3780. Models provide different combinations of card reading, card punching, and/or line printing capabilities, at transmission speeds ranging from 1200 to 7200 bits (150 to 900 characters) per second. Data is transmitted under IBM's Binary Synchronous Communications (BSC) line discipline technique in ASCII or EBCDIC data code.

As in the case of the Teletype terminals, the widespread acceptance of the IBM 2780/3780 has led to the introduction of competitive terminals which offer functional compatibility, usually at lower prices. Numerous "intelligent" (programmable) terminals, such as those produced by Northern Telecom, Harris, and Mohawk, can emulate the functions of the IBM 2780/3780 and other popular batch terminals.

Many of the remote computing companies also support the use of small computers, such as the Digital Equipment PDP-11, Data General Nova and Eclipse, IBM Series/1, Honeywell Level 62 and Level 6, and Univac 90/25, 90/30, and 90/40, as remote batch terminals or workstations. These independently programmed computers can serve as "intelligent terminals," processing some data locally and providing great flexibility in their communications functions. Their costs, as might be expected, are comparatively high.

### Software

*Conversational programming languages.* This entry lists the programming languages offered by each company for interactive use by customers at remote terminals. The term "conversational" implies a high degree of interaction between the programmer and the computer system throughout the program entry and debugging process.

In most cases, each statement of the source-language program is checked for proper syntax as the user enters it, and any necessary corrections can be made immediately. After the whole program has been entered and checked, one of two basic techniques is usually followed to get it into operation: the program may either be compiled into a machine-language object program and then executed in conventional fashion, or it may be executed immediately in an interpretive mode. Interpretive execution saves compilation time and facilitates program changes, but it also requires that each source-language statement be translated into the appropriate machine instructions every time it is executed—an inherently inefficient process.

FORTRAN, COBOL, BASIC, and APL are by far the most popular conversational programming languages for remote computing use.

FORTRAN (FORmula TRANslation) has been the most widely used scientific programming language for more than two decades. It uses symbols and expressions similar to those of algebra to express the procedures for performing computational and logical processes. Though it was designed strictly for scientific applications, FORTRAN has been successfully used for a wide range of business data processing functions as well. There are many different versions of the FORTRAN language, but conversions of FORTRAN programs from one version to another can usually be made with comparatively little difficulty.

COBOL (COMmon Business Oriented Language) was first available in 1960 and is by far the most widely used programming language for business applications. COBOL is generally best used in applications that require relatively simple computational algorithms and/or high volume input/output. COBOL program design emphasizes detailed specification of the properties and structure of input/output files and utilizes easy-to-use English-type language statements that make programs readable enough to be largely self-documenting. Though originally designed for batch-mode processing, recent years have seen the implementation of a number of interactive COBOL compilers.

BASIC (Beginners' All-purpose Symbolic Instruction Code) was developed at Dartmouth College to provide nonprogrammers with the capability to write programs in an easy-to-use language that resembles standard mathematical notation. BASIC is well suited for use in conversational-mode programming and debugging, and has rapidly gained wide acceptance among suppliers and users of remote computing services. Like FORTRAN, BASIC was designed for scientific and mathematical programming but has also been successfully used for business data processing. Many of the remote computing companies offer extended "supersets" of the BASIC language which considerably increase its capabilities. (Note, however, that the use of these extended language facilities in your programs may effectively cause you to become "locked in" to the particular company that offers them.)

Conceived in the early 1960's by Dr. Kenneth E. Iverson of IBM, APL (A Programming Language) was designed to permit clear, concise expression of computational algorithms. APL's proponents claim (with some justification) that it is "more powerful than FORTRAN and easier to learn than BASIC." APL uses a much larger set of symbols and operators and a considerably different syntax than either FORTRAN or BASIC. Its facilities for handling vectors and arrays are especially powerful, yet simple to use.

Other general-purpose languages offered in conversational implementations include ALGOL, PASCAL, and PL/I, together with a variety of symbolic assembly languages. In addition, many of the remote computing companies offer special-purpose languages designed for specialized functions such as list processing (e.g., LISP and SNOBOL), text editing, and program debugging. ▷

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▷ *Batch-mode programming languages.* The languages offered by each remote computing company for batch-mode (i.e., non-interactive) compilation are listed in this entry. In general, the batch-mode language processors place a considerably greater emphasis upon the generation of efficient object programs than do their conversational-mode counterparts. Therefore, their use can lead to substantial savings in computer time for "production" programs which are run on a regular basis. Batch-mode compilers for virtually every programming language currently in use are offered by one or more of the remote computing companies. By far the most popular languages for batch-mode use are FORTRAN for scientific applications and COBOL for business data processing.

*Principal applications.* For most remote computing users, the range and capabilities of the available application programs rank among the most important factors in choosing a particular supplier. Thousands of dollars worth of programming efforts can often be saved through the use of suitable ready-made programs, and most of the remote computing companies now offer a broad spectrum of programs to choose from.

Because of space limitations, the main comparison charts show only the principal application areas supported by each company—and the entry "business & scientific" is used for the many suppliers that offer hardware and software designed to support both commercial and scientific applications. This information provides a general guideline only for quick comparisons. The charts on pages C51-010-107 and -108 show which of 27 groups of applications are available from each of the remote computing companies. In addition, the charts indicate what level of support for user program development is available from the vendor.

### Charges

One of the most complex and confusing aspects of the current remote computing scene is the pricing of the services. There has been no general agreement to date as to the best technique for accounting and charging for the system resources used by each customer. As a result, prospective users are confronted by a bewildering array of rate schedules. The diverse pricing policies make cost comparisons very difficult and accentuate the desirability of benchmark testing. Many vendors offer different pricing options, and users should carefully scrutinize alternate plans to select the one that best suits their needs.

Some remote computing companies impose no minimum monthly charge, while a few charge *only* a single, all-inclusive monthly service fee, and a number of companies offering specialized services bill their customers on a per-transaction or per-item basis. Most companies bill the user for each second of central processor time, while others include the processor time as part of the terminal connect charge. Some companies provide each user with

a certain amount of "free" mass storage space, while others do not. Some companies impose a one-time charge for initiation of service, and some have special pricing schedules for certain application programs. In addition, there are usually separate charges for the use of central-site peripheral devices (such as card readers and printers), for punched cards and printer forms, and for extra programming manuals and training courses.

The principal pricing elements for each remote computing company, in both the interactive and remote batch modes, are summarized in the comparison chart entries under the "Charges" heading. The indicated rates usually provide a range, depending on whether use is prime-time or non-prime-time. Many suppliers offer lower rates during non-prime hours, and discounts for volume usage are common. Remember that in addition to the charges listed in the charts, users usually must bear the cost of their terminals, modems, and communications facilities.

*Minimum monthly charge.* This is the minimum charge, if any, that is imposed for each month of remote computing service. The companies that impose no minimum charge will naturally be of particular interest to users who plan to deal simultaneously with several different suppliers or to very small-volume users.

*Terminal connect time.* This entry shows the charge for each hour of time during which an interactive or remote batch terminal is "on-line" (i.e., connected to the central computer).

*Central processor time.* Most remote computing companies impose a specific charge for each minute (or second) of time during which the central processor is working on the user's program. In some cases, this charge varies with the amount of main memory occupied by the program. Other companies allocate their central processor charges on the basis of more complex units with names like "Core Unit" or "Computer Resource Unit." Typically, such units are functions of the amount of processor time, main memory space, and input/output activity required by each program. Definitions vary significantly from service to service, and users should contact the vendors for specific delineations of their resource units.

*Mass storage.* Virtually every remote computing company has large-capacity disk storage units at its computer site. Users can rent as much of this mass storage space as they need for on-line storage of programs and files, at the rates indicated in this entry. The storage space is usually rented in units of one track or sector, whose capacity depends upon the physical format of the available mass storage device. Storage charges may be computed on the basis of either the average or maximum amount of storage used during each month; it's important to find out which basis your prospective suppliers use. Discounts are frequently granted for large-volume storage requirements. ▷

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### ► Comments

This final entry on the comparison charts is used to explain or amplify the preceding entries and/or to provide other pertinent information about each company's services.

### Remote Computing Suppliers

Listed below, for your convenience in obtaining additional information, are the headquarters addresses and telephone numbers of the 115 remote computing companies whose services are described in the comparison charts.

**ADP Network Services**, 175 Jackson Plaza, Ann Arbor, Michigan 48106. Telephone (313) 769-6800.

**American Management Systems, Inc.**, 1777 N. Kent Street, Arlington, Virginia 22209. Telephone (703) 841-6421.

**Amherst Associates, Inc.**, 20 North Clark Street, Chicago, Illinois 60202. Telephone (312) 346-0900.

**Arens Applied Electromagnetics, Inc.**, 15801 White Rock Road, Gaithersburg, Maryland 20760. Telephone (301) 948-6249.

**Avco Computer Services**, 201 Lowell Street, Wilmington, Massachusetts 01887. Telephone (617) 729-7700.

**Babcock & Wilcox Company**, P.O. Box 1260, Lynchburg, Virginia 24505. Telephone (804) 384-5111.

**Boeing Computer Services Co.**, 177 Madison Avenue, Morristown, New Jersey 07960. Telephone (201) 540-7700.

**Bowne Information Systems**, 160 Water Street, New York, New York 10038. Telephone (212) 952-4400.

**BRS Bibliographic Retrieval Service**, 702 Corporation Park, Scotia, New York 12302. Telephone (518) 374-5011.

**Burroughs Corporation**, NYC Data Center, 80 Pine Street, New York, New York 10005. Telephone (212) 752-7333.

**Chase Econometrics/Interactive Data Corporation**, 486 Totten Pond Road, Waltham, Massachusetts 02154. Telephone (617) 890-1234.

**Citishare**, 399 Park Avenue, 21st Floor, New York, New York 10043. Telephone (212) 559-3636.

**Clyde Enterprises, Inc.**, 6 DeAngelo Drive, P.O. Box 348, Bedford, Massachusetts 01730. Telephone (617) 275-6642.

**Community Computer Corporation**, 185 West School House Lane, Philadelphia, Pennsylvania 19144. Telephone (215) 849-1200.

**Compudial, Inc.**, 2 Keystone Avenue, Cherry Hill, New Jersey 08003. Telephone (609) 424-4700.

**CompuServe, Inc.**, 5000 Arlington Centre Boulevard, Columbus, Ohio 43220. Telephone (614) 457-8600.

**Computel Systems Limited**, Place de Ville, 14th Floor, Tower B, 112 Kent Street, Ottawa, Ontario K1P 5P2. Telephone (613) 238-6061.

**The Computer Company, Inc.**, 1905 Westmoreland Street, Richmond, Virginia 23230. Telephone (804) 358-2171.

**Computer Innovations**, 55 East Jackson Boulevard, Suite 1616, Chicago, Illinois 60604. Telephone (312) 663-5930.

**Computer Network Corporation**, 5185 MacArthur Boulevard N.W., Washington, D.C. 20016. Telephone (202) 537-2500.

**Computer Resource Services, Inc.**, 6501 North Black Canyon, Phoenix, Arizona 85015. Telephone (602) 242-9121.

**Computer Sciences Canada, Ltd.**, Suite 367, Place du Canada, Montreal, Quebec H3B 2N8. Telephone (514) 878-9811.

**Computer Sciences Corporation**, 650 North Sepulveda Boulevard, El Segundo, California 90245. Telephone (213) 322-6204.

**Computer Sciences Corporation, Business Services Division (formerly a division of Intel Corporation)**, 6701 South Sepulveda Boulevard, Los Angeles, California 90045. Telephone (213) 649-2660.

**Computer Sharing Services, Inc.**, One Tamarac Square, 7555 E. Hampden Avenue, Suite 104, Denver, Colorado 80231. Telephone (303) 695-1500.

**Computer Usage Company**, 141 Battery Street, San Francisco, California 94111. Telephone (514) 543-3940.

**Computone Systems, Inc.**, One Dunwoody Park, Atlanta, Georgia 30338. Telephone (404) 393-3010.

**Comshare, Incorporated**, P.O. Box 1588, 3001 South State Street, Ann Arbor, Michigan 48106. Telephone (313) 994-4800.

**Comshare Limited**, 230 Galaxy Boulevard, Rexdale, Ontario M9W 5R8. Telephone (416) 675-6363.

**CONCAP Computing Systems**, 7700 Edgewater Drive, Suite 700, Oakland, California 94621. Telephone (415) 635-5750.

**Control Data Corporation**, P.O. Box O, Minneapolis, Minnesota 55440. Telephone (612) 853-8100.

**CSG—Keydata Division (formerly Keydata Canada)**, 885 Don Mills Road, Don Mills, Ontario M3C 3H1. Telephone (416) 443-6800.

**CSG—Multiple Access Division (formerly Multiple Access, Limited)**, 885 Don Mills Road, Don Mills, Ontario M3C 3H1. Telephone (416) 443-3900.

**CSG—Processing Services**, 2599 Speakman Drive, Mississauga, Ontario M4Y 1K7. Telephone (416) 822-5000.

**Cybershare Limited**, 550 Berry Street, Winnipeg, Manitoba R3H 0R9. Telephone (204) 775-0181.

**Data Resources, Inc.**, 29 Hartwell Avenue, Lexington, Massachusetts 02173. Telephone (617) 861-0165.

**Data-Tek Corporation**, 1211 Chestnut Street, Room 400, Philadelphia, Pennsylvania 19107. Telephone (215) 564-4133.

**Datacrown, Inc.**, 650 McNicoll Avenue, Willowdale, Ontario M2H 2E1. Telephone (416) 499-1012.

**Dataline Systems Limited**, 175 Bedford Road, Toronto, Ontario M5R 2L2. Telephone (416) 964-9515.

**Datalogics, Inc.**, 11001 Cedar Avenue, Cleveland, Ohio 44106. Telephone (216) 229-1300.

**Dialcom, Inc.**, 1104 Spring Street, Silver Spring, Maryland 20910. Telephone (301) 588-1572.

**Ecotran Corporation**, 21111 Chagrin Boulevard, Beachwood, Ohio 44122. Telephone (216) 991-9000.

**Electronic Data Systems**, 7171 Forest Lane, Dallas, Texas 75230. Telephone (214) 661-6000. ►

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- ▷ **Financial Data Systems, Inc.**, 763 New Ballas Road South, St. Louis, Missouri 63141. Telephone (314) 567-1940.
- General Electric Company, Information Services Business Division**, 401 North Washington Street, Rockville, Maryland 20850. Telephone (301) 340-4000.
- Genesee Computer Center, Inc.**, 20 University Avenue, Rochester, New York 14605. Telephone (716) 232-7050.
- GTE Data Services, Inc.**, First Florida Tower, P.O. Box 1548, Tampa, Florida 33601. Telephone (813) 224-3131.
- HDR Systems, Inc.**, 8404 Indian Hills Drive, Omaha, Nebraska 68114. Telephone (402) 399-1400.
- Honeywell Information Systems, Inc.**, Honeywell Plaza, Minneapolis, Minnesota 55408. Telephone (612) 870-6000.
- Informatics, Inc., Data Services Operations**, 6 Kingsbridge Road, Fairfield, New Jersey 07006. Telephone (201) 575-2800.
- Information Consultants, Inc. (ICI)**, 2021 "L" Street, N.W., Suite 300, Washington, D.C. 20036. Telephone (202) 822-5200.
- Information Science, Incorporated**, 95 Chestnut Ridge, Road, Montvale, New Jersey 07645. Telephone (201) 391-1600.
- Information Systems Design, Inc.**, 2500 Mission College Boulevard, Santa Clara, California 95054. Telephone (408) 727-8100.
- Insurance Processing Services**, 3001 Butterfield Road, Suite 250, Oakbrook, Illinois 60521. Telephone (312) 789-0012.
- Intelligent Systems Corporation of Massachusetts**: See Clyde Enterprises, Inc.
- Interactive Data Corporation**: See Chase Econometrics/Interactive Data Corporation.
- Interactive Market Systems, Incorporated**, 19 West 44th Street, New York, New York 10036. Telephone (212) 869-8810.
- Interactive Sciences Corporation**, 60 Brooks Drive, Braintree, Massachusetts 02184. Telephone (617) 848-2660.
- Keydata Canada**: See CSG—Keydata Division.
- Keydata Corporation**, 20 William Street, Wellesley, Massachusetts 02181. Telephone (617) 237-6930.
- Litton Computer Services, Litton Systems, Inc.**, 1831 Michael Faraday Drive, Reston, Virginia 22090. Telephone (703) 471-9200.
- Litton Mellonics Information Center**, 6701 Variel Avenue, Canoga Park, California 91303. Telephone (213) 887-5100.
- Management Concepts, Inc.**, 340 Interstate North Office Park, Suite 3300, Atlanta, GA 30339. Telephone (404) 955-4024.
- Management Systems Corporation**, 200 East South Temple, Salt Lake City, Utah 84111. Telephone (801) 524-2000.
- Mark/Ops, Division of Northeastern Systems Assoc.**, 475 Commonwealth Avenue, Boston, Massachusetts 02215. Telephone (617) 266-1930.
- Martin Marietta Data Systems**, 6301 Ivy Lane, Suite 300, Greenbelt, Maryland 20770. Telephone (301) 345-0100.
- McDonnell Douglas Automation Company (McAuto)**, P.O. Box 516, St. Louis, Missouri 63166. Telephone (314) 232-8021.
- Monchik Weber Corporation**, 111 John Street, New York, New York 10038. Telephone (212) 962-2400.
- Monchik Weber Wall Street Concepts, Inc.**, 110 Wall Street, New York, New York 10005. Telephone (212) 363-2230.
- Multiple Access Limited**: See CSG—Multiple Access Division.
- National Computer Network of Chicago, Inc.**, 1929 North Harlem Avenue, Chicago, Illinois 60635. Telephone (312) 622-6666.
- National CSS, Inc.**, 187 Danbury Road, Wilton, Connecticut 06897. Telephone (203) 762-2511.
- National Data Corporation**, One National Data Plaza, Atlanta, Georgia 30329. Telephone (404) 329-8500.
- National Information Services, Inc.**, 20370 Town Center Lane, Suite 245, Cupertino, California 95014. Telephone (408) 257-7700.
- NLT Computer Services Corporation**, 1777 Walton Road, Blue Bell, Pennsylvania 19422. Telephone (215) 542-8300.
- Ohio Valley Data Control, Inc.**, 2505 Washington Boulevard, Belpre, Ohio 45714. Telephone (614) 423-9501.
- On-Line Business Systems, Inc.**, 115 Sansome Street, San Francisco, California 94104. Telephone (415) 391-9555.
- Online Computer Library Center (OCLC)**, 6565 Frantz Road, Dublin, Ohio 43017. Telephone (614) 764-6000.
- On-Line Systems, Inc.**, 115 Evergreen Heights Drive, Pittsburgh, Pennsylvania 15229. Telephone (412) 931-7600.
- Optimum Systems, Incorporated**, 5615 Fishers lane, Rockville, Maryland 20852. Telephone (301) 468-1000.
- Planning Research Corporation (PRC) Computer Services**, 1500 Planning Research Drive, McLean, Virginia 22071. Telephone (703) 893-4880.
- Polycom Systems Limited**, 133 Wynford Drive, Don Mills, Ontario M3C 1K1. Telephone (416) 449-3400.
- Profitool, Inc.**, 1777 South Harrison Street, Suite 505, Denver, Colorado 80210. Telephone (303) 758-8820.
- Programs & Analysis, Inc.**, 21 Ray Avenue, Burlington, Massachusetts 01803. Telephone (617) 272-7723.
- Proprietary Computer Systems, Inc.**, 16625 Saticoy Street, Van Nuys, California 91406. Telephone (213) 781-8221.
- Pryor Corporation**, 400 North Michigan Avenue, Chicago, Illinois 60611. Telephone (312) 644-5650.
- Quanex Management Sciences**, 27777 Franklin Road, Suite 1000, Southfield, Michigan 48034. Telephone (313) 353-7200.
- Rapidata, Inc.**, 253 Passaic Avenue, Fairfield, New Jersey 07006. Telephone (201) 227-0035.
- Remote Computing Corporation**, 1076 East Meadow Circle, Palo Alto, California 94303. Telephone (415) 494-6111.
- Reynolds and Reynolds**, 800 Germantown Street, Dayton, Ohio 45401. Telephone (513) 443-2000.
- Ross Systems, Inc.**, 1900 Embarcadero Road, Suite 208, Palo Alto, California 94303. Telephone (415) 856-1100.
- Rotelcom Data, Inc.**, 67 Chestnut Street, Rochester, New York 14604. Telephone (716) 546-5060.
- Scientific Computers, Inc.**, 10101 Bren Road East, Minnetonka, Minnesota 55343. Telephone (612) 933-4200. ▷

## All About Time-Sharing and Remote Computing Services

▷ **Scientific Process & Research, Inc.**, 67 Veronica Avenue, Somerset, New Jersey Telephone (201) 846-3477.

**The Service Bureau Company, (a Control Data company)**, 500 West Putnam Avenue, Greenwich, Connecticut 06830. Telephone (203) 622-2000.

**Shared Medical Systems, Inc.**, 650 Park Avenue, King of Prussia, Pennsylvania 19406. Telephone (215) 265-7600.

**I.P. Sharp Associates Limited**, 145 King Street West, Toronto, Ontario M5H 1J8. Telephone (416) 364-5361.

**Sigma Data Computer Corporation**, 5515 Security Lane, Rockville, Maryland 20852. telephone (301) 984-3636.

**A.O. Smith Corporation—Data Systems**, 8901 North Kildeer Court, Brown Deer, Wisconsin 53209. Telephone (414) 449-2900.

**Statistical Tabulating Corporation**, 2 North Riverside Plaza, Chicago, Illinois 60606. Telephone (312) 454-8000.

**STSC, Inc. (formerly Scientific Time Sharing Corporation)**, 7316 Wisconsin Avenue, Bethesda, Maryland 20014. Telephone (301) 657-8220.

**Sun Information Services Company**, 280 King of Prussia Road, Radnor, Pennsylvania 19087. Telephone (215) 293-8000.

**Sun Information Services of Kentucky:** See TLG Computing Services, Inc.

**System Development Corporation**, 2500 Colorado Avenue, Santa Monica, California 90406. Telephone (213) 820-4111.

**Systems Dimensions Limited:** See Datacrown, Inc.

**Technical Advisors, Inc.**, 4455 Fletcher Street, Wayne, Michigan 48184. Telephone (313) 722-5010.

**Tel-A-Data, Inc.**, 1500 Northwest 167th Street, Miami, Florida 33169. Telephone (305) 625-8266.

**Teledata, Inc.**, P.O. Box 364, Hanover, New Hampshire 03755. Telephone (603) 448-5005.

**Telstat Systems, Inc.**, 150 East 58th Street, New York, New York 10022. Telephone (212) 826-0640.

**Timesharing Consultants, Inc.**, 6420 East Broadway, Suite C300, Tucson, Arizona 85710. Telephone (602) 745-2060.

**Timesharing Management, Inc.**, 806 Massachusetts Avenue, Cambridge, Massachusetts 02139. Telephone (617) 661-9166.

**Time Sharing Resources, Inc.**, 777 Northern Boulevard, Great Neck, New York 11021. Telephone (516) 487-0101.

**TLG Computing Services, Inc.**, P.O. Box 36305, Louisville, Kentucky 40233. Telephone (502) 361-7161.

**Tymshare, Inc.**, 20705 Valley Green Drive, Cupertino, California 95014. Telephone (408) 446-6000.

**United Computing Systems, Inc.**, P.O. Box 8551, Kansas City, Missouri 64114. Telephone (913) 341-9161.

**University Computing Company**, 8303 Elmbrook Drive, Dallas, Texas 75247. Telephone (214) 353-7100.

**USS Engineers and Consultants, Inc.**, 600 Grant Street, Room 3383, Pittsburgh, Pennsylvania 15230. Telephone (412) 391-8115.

**Wang Data Center, Division of Wang Laboratories, Inc.**, 20 South Avenue, Burlington, Massachusetts 01803. Telephone (617) 272-8550.

**Warner Computer Systems, Inc.**, 259 Cedar Lane, Teaneck, New Jersey 07666. Telephone (201) 692-9400.

**Western New York Computing Systems, Inc.**, 2129 Five Mile Line Road, P.O. Box 56, Penfield, New York 14526. Telephone (716) 381-4120.

**Xerox Computer Services**, 5310 Beethoven Street, Los Angeles, California 90066. Telephone (213) 306-4000.□

## All About Time-Sharing and Remote Computing Services

COMPANY	ADP Network Services, Inc.	ADP Network Services Inc.	American Management Systems, Inc.	American Management Systems, Inc.	Amherst Associates, Inc.
<b>GENERAL</b>					
Name of service	Remote Computing Services	ADP Onsite Service	AMSHARE	CMS	HSL, AMY, PAYSIM, DRG Financial Modeling, Medstaff 1975
Date operational	July 1969	1978	1974	April 1980	
Areas currently served	Worldwide	United States, England, Western Europe, Canada	U.S.	U.S.	U.S.
<b>EQUIPMENT</b>					
Computers	DECsystem-10s in Ann Arbor, MI, Waltham, MA, and London, England	DEC 2020s	DEC 2060 (4)	IBM 3033	DEC 1170 in Amherst, MA
No. of simultaneous users	4000	32 per system	96	64	32/computer (300, 1200 bps)
Conversational terminals supported	All async 110, 300 and 1200 bps terminals and other graphic terminals	All async 110, 300 and 1200 bps terminals and other graphic terminals	TTY at 30-120 cps	TTY at 30-120 cps, IBM 3270	Teletype-compat.
Batch terminals supported	IBM 2780/3780 and compatible bisync. terminals	IBM 2780/3780 and compatible bisync. terminals; HASP	IBM HASP, IBM 3780	—	IBM 3780
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC, COBOL, MACRO 10	FORTRAN, BASIC, APL, COBOL, MACRO 10, PASCAL	APL, BASIC, COBOL, FORTRAN	BASIC, COBOL, FORTRAN, PL/1	None
Batch-mode programming languages	FORTRAN, COBOL, BASIC	FORTRAN, BASIC, APL, COBOL, MACRO 10, PASCAL	COBOL, FORTRAN, Data Base/Query	COBOL, FORTRAN, PL/1	None
Principal applications	Business, finan. mgt., statistical analysis, banking, international network applications, etc.	Business, finan. mgt., statistical analysis, banking, international network applications, etc.	Business, scientific & data base management	Business, scientific, financial modeling, data base management	Financial modeling, payroll, financial analysis, med. staff analysis, & planning
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	\$6,000	None	None	Contact vendor
Remote batch	None	\$6,000	None	None	—
Terminal connect time:					
Interactive	\$10.00-16.00/hr.	None	\$7.00 pr./4.00 non-pr.	\$12 prime/\$6 non-prime	\$16.00/hr.
Remote batch	None	None	None	None	—
Central processor time:					
Interactive	\$0.024/CRU	None	\$0.14/RU; \$0.08/RU	\$0.14/RU (prime); \$0.07	Varies
Remote batch	\$0.022-0.02/CRU	None	\$0.06 RU	\$0.07 (prime); \$0.05	—
Mass storage:					
Interactive	\$0.06-0.75/1000 chars./month	None	Scaled \$0.005-0.02, 2540 char./day	Scaled \$0.80-2.40	\$1.10/100 blocks/day
Remote batch	\$0.06-0.75/1000 chars./month	None	—	460,000 char./day	—
<b>COMMENTS</b>	ADPNS is a division of Automatic Data Processing, serving over 80,000 clients around the world; in addition to ready-to-use software packages, ADPNS provides customized software development for almost any application	ADP/Onsite Service places a full-scale time-shared computing system on the client's premises. Services include systems & applications software and technical support. ADP/Onsite consolidates the client's timesharing into one system, often at a dramatic savings in cost.	RU is based on CPU time as well as memory and paging	RU is based on CPU time as well as memory and I/O	Services designed for hospital use, with installation charge varying by hospital size & complexity; Hospital Systems Library (HSL) includes program enhancements, unlimited service; Amherst Multi-Year Model (AMY) used to develop forecasts of financial position; Payroll Simulation (PAYSIM) used to analyze alternative staffing plans; DRG used to provide P/L by physicians, clinical service, and case type

## All About Time-Sharing and Remote Computing Services

COMPANY	Arens Applied Electromagnetics, Inc.	Avco Computer Services	Babcock and Wilcox Company	Boeing Computer Services Co.	Boeing Computer Services Co.
<b>GENERAL</b>					
Name of service	Computer Services	Avco Computer Services	B & W Computer Services	MAINSTREAM—CTS	MAINSTREAM—TSO
Date operational	December 1969	1958	1971	May 1970	Feb. 1973
Areas currently served	Wash. DC area, other US and int'l. via Tymnet	Worldwide	US, Canada, Japan, Germany	Continental US, (including Alaska) and Canada via nationwide data communications network; also United Kingdom	Continental US, (including Alaska) and Canada via nationwide data communications network; also United Kingdom
<b>EQUIPMENT</b>					
Computers	HP 3000 III	IBM 3033 (2)	CDC CYBER 720, 750, & 76 in Lynchburg, VA	IBM 3033s in Vienna, VA	IBM 3033s in Vienna, VA
No. of simultaneous users	32	300-1200 bps, 850; 2K-19.2K, 250	216	300	180
Conversational terminals supported	All ASCII terminals at 300 or 1200 bps	IBM 2741, TTY 33/35, IBM 3270 and compatibles	All ASCII terminals At 300 or 1200 bps	TTY and compatible units at 10, 30 or 120 cps; IBM 2741 and compatible units at 14.8 cps plus 30 IBM 3270 type	TTY and compatible units at 10, 30, 120 cps; IBM 2741 and compatible units at 14.8 cps plus IBM 3270 type
Batch terminals supported	All ASCII terminals at 300 or 1200 bps	IBM HASP/2780/3780 and compatibles	IBM HASP, 2780, 3780; CDC 200 UT	IBM 2780, 3780, 360/20, 1130, 6670, or any other HASP RJE terminal	IBM 2780, 3780, 360/20 1130, 6670, or any other HASP RJE terminal
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, COBOL, SPL, PASCAL	BASIC, COBOL, FORTRAN, PASCAL/VS	FORTRAN, BASIC, COBOL, PASCAL, COMPASS	FORTRAN, BASIC, COBOL, PL/1, VSAPL, Assembler	FORTRAN, COBOL, PL/1, Assembler
Batch-mode programming languages	FORTRAN, COBOL, SPL	COB, FORT, PL/1, RPG, PASCAL/VS, VS/BASIC	FORTRAN, BASIC, COBOL, PASCAL, COMPASS	FORTRAN, VSAPL, COBOL, PL/1, BASIC, Assembler	FORTRAN, COBOL, PL/1, Assembler
Principal applications	Business, engineering, scientific, legal, architectural, educational, graphics	Accounting, scientific, manuf., stat., financial modeling, engineering	Engineering, scientific, mathematical	Business, finance data base management graphics & statistics	Business, data base management, graphics & statistics
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	—	None	\$500-1,440*	\$500-1,440*
Remote batch	None	—	None	\$500-1,440*	\$500-1,440*
Terminal connect time:					
Interactive	\$5.00-20.00/hr.	\$4-10 hr.	\$15.50-20.00/hr.	\$4.00-22.00/hr.*	\$4.00-22.00*
Remote batch	\$5.00-20.00/hr.	\$10-30 hr.	\$15.00-18.00/hr.	\$4.00-22.00/hr.*	\$4.00-22.00/hr.*
Central processor time:					
Interactive	\$0.06-0.08/CPU sec.	\$380-1800/ACU hr.	\$0.20	\$0.08-0.16 per CSU/ARU	\$1.00-2.00/hr.
Remote batch	\$0.04-0.08/CPU sec.	\$380-1800/ACU hr.	\$0.09-0.29 (700 series); 0.15-1.15 on 76	\$0.04-0.16 per CSU/ARU	\$0.50-3.00/hr.
Mass storage:					
Interactive	\$16.00/256K bytes/mo.	\$0.05/3350 chars./day	\$.0034/640 chars./day	\$0.0013-0.0587/1K char./day	Contact vendor
Remote batch	\$16.00/256K bytes/mo.	\$0.05/3350 chars./day	\$.0034/640 chars./day	\$0.0013-0.0587/1K char./day	Contact vendor
<b>COMMENTS</b>	Provides general computing services plus specialty services for interactive creation of line, bar, pie, or word charts (Presentation Graphics), DBMS & word processing packages for legal and related professions and piping and hydraulic design and analysis; WP 3000 Word Processing software interfaces with HP's DBMS, IMAGE/QUERY	Provide timesharing, batch & transaction processing svcs., extensive library of application & development s/w; graphics on Information Int'l. FR80 & Applicon Color Plotter; facility management service	Specialty is nuclear and structural engineering and mathematics; support Scope 2.0, NOS/BE, & NOS operating systems; other packages include mathematical & applied mechanics	Interactive time-sharing services; deferred batch service at 50% savings over prime interactive; *User may select to be billed on a monthly or daily connect time basis	Offers remote job entry over a range of service times (1 minute to overnight); *User may select to be billed on a monthly or daily connect time basis

## All About Time-Sharing and Remote Computing Services

COMPANY	Boeing Computer Services, Co.	Bowne Information Systems	BRS Bibliographic Retrieval Service	Burroughs Corporation	Chase Econometrics/ Interactive Data Corporation
<b>GENERAL</b>					
Name of service	MAINSTREAM—EKS	Bowne Information Systems	BRS/PDS (Private Database Service)	NYC Data Center	CS/ES
Date operational	Jan. 1975	Nov. 1969	1978	1971	1968
Areas currently served	Continental US, (including Alaska) and Canada via nationwide data communications network; also United Kingdom	Atlanta, Boston, Conn., Chicago, Houston, L.A., New York, New Jersey, Phila., San Francisco, & Washington, DC areas	Worldwide	Continental US; worldwide via communications network	Worldwide
<b>EQUIPMENT</b>					
Computers	Cyber 175 (2), Cyber 750, Cyber 760 (3), IBM 3031 (2), Cray-1 in Seattle, WA	IBM 370/155 (2), IBM 4300 in New York City	IBM 370/155 (2), A/S 5000 (1)	Burroughs B 6700, B 6800 in New York City	Multiple Amdahl 470/V8s in Waltham, MA
No. of simultaneous users	640	300	No practical limit	150	500+
Conversational terminals supported	TTY-compatible units at 10, 30, or 120 cps; IBM 2741-compatible units at 14.8 cps	IBM 2741, TTY, and compatible units at 10, 14.8, 15, 30, or 120 cps; BSC at 2400 bps; Xerox, Lanier, CPT, Lexitron, etc.	Any ASCII terminal	All TTY-compatible at up to 1200 bps	TTY and compatible ASCII terminals at 10, 30 or 120 cps; IBM 2741
Batch terminals supported	COPE, HASP, IBM 2780/3780, CDC 200 UT	—	None	Burroughs B 80, B 800, B 1800, IBM 2780	IBM 2780/3780, 3741 and compatible EBCDIC units at 2K, 2.4K and 4.8K bps
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, COBOL, BASIC, APL, Compass, Simscript, SPSS, System 2000	Proprietary languages designed for application specialties	Not applicable	BASIC, APL, COBOL, FORTRAN	FORTRAN, BASIC, APL, COBOL, PL/1, XSIM, Assembler, XDMS
Batch-mode programming languages	FORTRAN, COBOL, APL, Compass, Simscript, SPSS	—	Not applicable	FORTRAN, COBOL, ALGOL, PL1	FORTRAN, BASIC, COBOL, PL/1, Assembler, XSIM, XSCAN, XDMS
Principal applications	Engineering, scientific, & data base management	Records mgt., text proc., photocomposition, and correspondence services for engineering, legal and other applications	On-line database creation, retrieval & maintenance	Business and scientific, word processing	Business, financial, economic, cash mgmt., financial modeling, data collection
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	\$300	See Comments	None	\$150-total batch and interactive
Remote batch	None	—	NA	None	—
Terminal connect time:					
Interactive	\$10.00-22.00/hr.	\$4.45-6.80/hr.	\$16.00/hr.*	\$11.50/hr.	\$16.00/hr.
Remote batch	\$10.00-22.00/hr.	—	—	\$11.50/hr.	—
Central processor time:					
Interactive	\$0.20/CCU	\$0.01/Proc Unit	NA*	\$0.38/sec.	\$0.16/charge unit
Remote batch	\$0.010-0.125/CCU	—	NA	\$0.38/sec.	\$0.08/charge unit
Mass storage:					
Interactive	\$0.0015-0.0070 for each 640 char./day	\$0.28/1550 chars./month	\$12.00/2 million chars./month*	\$0.02/1K char./day	\$0.085-0.47/1K chars./month
Remote batch	\$0.0015-0.0070 for each 640 char./day	—	NA	\$0.02/1K char./day	\$0.085-0.47/1K chars./month
<b>COMMENTS</b>	Offers both interactive time-sharing and remote job entry to multiple mainframes, with access to the same files in either mode	Service specialties include Word/One (text editing, photocomposition), PhotoComp (typesetting), MailPac (name/address and letter service), COMSPEC (engineering specification production), KeySearch (records mgt. service with special applications for litigation support), and LASER services	*A minimum annual fee of \$7,500 for the initial year and \$5,000 for subsequent years applies, against which connect time, storage usage, and other charges are offset	Page printer service now available on Burroughs B9270 laser printer	Packages include banking, insurance, finance, brokerage, math, graphics, modeling, econometric data, management science, data base management, text processing, merger/acquisition analysis, securities analysis, cash management, data collection

## All About Time-Sharing and Remote Computing Services

COMPANY	CITISHARE Citibank	Intelligent Systems Corp.	Community Computer Corporation	Compudial, Inc.	CompuServe Inc.
<b>GENERAL</b>					
Name of service	Citishare	CEI	—	Compudial	—
Date operational	Jan. 1977 (DEC svcs.); Sept. 1980 (HIS systems)	June 1974	April 1981	1967	May 1970
Areas currently served	Continental U.S. and Canada; limited access overseas	Greater Boston area	Delaware Valley	Mid-Atlantic States	Nationwide
<b>EQUIPMENT</b>					
Computers	DECsystem-10(1) and DECsystem-20(2) in New York, NY; Honey- well 66/60 and Honey- well DPS 8/52 in Greenville, SC	DEC PDP-11 in Bedford, MA	BTI 4000 in Philadelphia, PA	NCR 201 (2)	DEC PDP-10 and -20 (19) Columbus, OH
No. of simultaneous users	200	8 at 300 or 1200 bps	30	250	2000
Conversational ter- minals supported	All ASCII-supported terminals at 10, 30, and 120 cps	Any TTY-compatible ASCII terminal	DECwriter printers at 10, 30 and 120 cps; video terminals	GE TermiNet 300 (split platen) at 10, 30, and 120 cps; Terminet 30/2030, TI, Intertec	All ASCII at 10, 15, 30, and 120 cps, IBM 2741 Corresp., CALL-360 & BCD
Batch terminals supported	IBM 2780/3780 and compatible	IBM 2780	—	—	IBM 2780
<b>SOFTWARE</b>					
Conversational pro- gramming languages	FORTTRAN, COBOL, BASIC, APL, Assembler, PL/1, GMAP, LISP, SNOBOL	BASICPLUS, BASIC- PLUS II, FORTRAN, MACRO 11	BASIC	NEAT 3, COBOL, FORTRAN, BASIC	FORTTRAN, BASIC, COBOL, APL, MACRO- 10
Batch-mode program- ming languages	FORTTRAN, COBOL, BASIC, APL, Assembler, GMAP	BASICPLUS, BASIC- PLUS II	—	—	FORTTRAN, BASIC, COBOL, Macro-10
Principal applications	Business & financial (esp. banking)	General accounting, materials handling, materials requirements planning	Accounting, job costing	Business	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:	\$250/mo.	None	\$200	None	\$100/mo.
Interactive	\$250/mo.	None	—	—	—
Remote batch					
Terminal connect time:	\$7.50-12.00/hr. (prime)	\$3.50/hr.	Contact vendor	None	\$10.00-30.00/hr.
Interactive	\$3.00-11.50/hr. (prime)	\$3.50/hr.	—	—	\$40.00-50.00/hr.
Remote batch					
Central processor time:	\$0.01-0.09/CRU* (prime)	\$1.00/kilo-core minute	—	See Comments	\$0.012-0.023/SRU
Interactive	\$0.01-0.09/CRU* (prime)	\$1.00/kilo-core minute	—	—	—
Remote batch					
Mass storage:	\$0.02/day/disk pg. (DEC); 0.07/1K char./day (HIS)	\$0.08/512 bytes average per month	—	See Comments	\$0.052/3200 char./day
Interactive	\$0.02/day/disk page	\$0.08/512 bytes average per month	—	—	\$0.052/3200 char./day
Remote batch					
<b>COMMENTS</b>	Pricing for terminal connect and CPU time varies according to non- prime and prime time usage; prime time is 8 AM to 6 PM (DEC) or 8 PM (HIS) Mon.-Fri.; one disk page equals 2560 characters, or any part thereof, on a per-file basis; extensive financial data bases available; volume and commitment discounts avail. for HIS systems *Computer Resource Unit (CPU time, core & I/O)	Business applications and special project orientation, with special package offerings and assistance for those obtaining their own computers		Costs are on a per- transaction/file storage basis; volume and commitment discounts are available; DDP capabilities; OEM for Intertec hardware	High-speed plotting available; volume and commitment discounts available; CompuStat and TELSTAT data bases offered; also, elec- tronic mail and mining packages

## All About Time-Sharing and Remote Computing Services

COMPANY	Computel Systems Limited	The Computer Company	Computer Innovations	Computer Network Corp. (COMNET)	Computer Resource Services, Inc.
<b>GENERAL</b>					
Name of service	Time Shared Processing	Action/APL.SV	APL Computernet, PCS TEXT	ALPHA	CRS
Date operational	1968	Oct. 1969	June 1969	Dec. 1967	1969
Areas currently served	Canada from offices in Victoria, Vancouver, Edmonton, Calgary, Winnipeg, Ottawa, Toronto, Montreal, Quebec, & Halifax	U.S., Canada, Mexico, France, Belgium & Switzerland	U.S.; Europe	Continental U.S. via national network access; local dial-up access in the Washington area	Phoenix, Tucson, Las Vegas areas
<b>EQUIPMENT</b>					
Computers	IBM 370/168(2), IBM 3033, ITEL AS5, IBM 4331, IBM 360/30(3) in Toronto; Univac 1100/81A, HP 3000(7)	IBM 370/158, Amdahl V6 in Richmond, VA	IBM 370/158, IBM 3031	Itel AS/6, IBM 370/158	HP 2000 (5) in Phoenix, AZ
No. of simultaneous users	Over 400	80-100	Not specified	150	32
Conversational terminals supported	IBM: IBM 2741- and Teletype-compatibles; Univac: Teletype-compatibles	IBM 2741, IBM 3270, Tektronix, TI 700 & 800, ASCII at 10, 15, 30 and 120 cps	Most hardcopy and video terminals at 15, 30, and 120 cps	IBM 2741, TTY 33/35, and compatible units at 10 to 120 cps	Any ASCII or Correspondence Code terminal at 10 to 30 cps
Batch terminals supported	IBM: IBM 360/20, 3780, 2780, 2770, 3741, 36/20, 3630, M20, 3777; Univac: IBM 360/20, 2780, 3780, Univac 1004, DCT 2000, NTR 9000	IBM 2780/3780, HASP and compatible units	IBM 2780/3780, HASP, and compatible units	IBM 2780, 1130, 360/20, and compatible units at 2000 to 9600 bps	—
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, COBOL, PL/1, Univac Demand, CTS, IBM TSO, TSO/SPF, Roscoe; HP MPE/III	APL, ADS, XPERT	APL, PCS/TEXT	All OS/MVT, MVS, TSO, WYLBUR languages	BASIC
Batch-mode programming languages	FORTRAN, COBOL, PL/1, Assembler, Mark IV	FORTRAN, COBOL, APL, SPSS, SAS	FORTRAN, COBOL, PL/1, Assembler	All OS/MVT, MVS languages	—
Principal applications	Accounting/financial, econometrics, engineering, mathematics/statistics, on-line banking	Business & scientific, many specialized	Financial, accounting, manufacturing, personnel, hospital, engineering, scientific	Business, scientific, & engineering	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$100	None	None	Contact vendor for pricing	\$50/mo.
Remote batch	\$100	None	None		—
Terminal connect time:					
Interactive	\$3.00/min. (IBM)	\$1.00/hr.	\$14.00-25.00/hr.	—	\$10-15/hr.
Remote batch	\$3.00/min. (IBM)	—	\$11.00/hr.	—	—
Central processor time:					
Interactive	See Comments	\$0.25/CRU*	\$0.0125/CRU	—	None
Remote batch	See Comments	\$0.65/CRU*	—	—	—
Mass storage:					
Interactive	\$20.00/volume/day	\$12.32/million bytes/day	\$15.00/1 million chars./day	—	\$0.060/1024 chars./month
Remote batch	\$20.00/volume/day	—	—	—	—
<b>COMMENTS</b>					
	Prices vary with computer and software system used; volume and commitment discounts are available; MVS/JES3, S2000, EASY-TRIEVE, CARMIS, WANG & others	Offers shared files and data base applications, specialized data bases, RJE, consulting, systems design, & contract programming  *CRU (Computer Resource Unit) is based on an algorithm of resource usage	Affiliated with Proprietary Computer Systems, Inc.; Computernet can mix batch and interactive, APL and TEXT; TEXT includes Photocomp; APL Computernet includes energy data bases & reports	Offers nationwide OS/MVT, MVS-compatible time-sharing services and remote job entry over a wide range of service times, terminal speeds, and charges; graphics package available	\$100 initiation fee; licenses available in other cities

## All About Time-Sharing and Remote Computing Services

COMPANY	Computer Sciences Canada, Ltd.	Computer Sciences Corporation (Infonet)	Computer Sciences Corporation, Business Services Division	Computer Sharing Services, Inc.	Computer Usage Company
<b>GENERAL</b>					
Name of service	CSTS	CSTS/CSTS8	Commercial Services	DTSS	MVS/WYLBUR/APL/CICS/TSO (SPF)/VM/CMS
Date operational	Jan. 1970	Jan. 1970	1968	Nov. 1967	Oct. 1975
Areas currently served	Local access in over 150 metropolitan areas throughout U.S., Canada, Mexico, & Europe	Local access in over 150 metropolitan areas throughout U.S., Canada, Mexico, & Europe	Nationwide	Local access available throughout the continental U.S., Canada, Mexico, and many foreign countries	Continental U.S., inbound WATS and via TYMNET
<b>EQUIPMENT</b>					
Computers	Univac 1108 (15) in Los Angeles, Chicago, Washington, DC, Toronto, & Calgary	Univac 1108 (15) in Los Angeles, Chicago, Washington, DC, Toronto, & Calgary; IBM 3033 in Dallas	IBM 370/155 (3), 360/50 (7), 360/40 (2), ITEL AS/5; in White Plains, NY; Pittsburgh, PA; Cleveland, OH; Chicago, IL; Oakland, CA; etc.	Honeywell dual 66/17 and three Honeywell 66/DPS in Denver; Tandem computer	Amdahl 470 V/6-II, 3031-equivalent
No. of simultaneous users	180 total	Over 1600	Approx. 680 per data center DECwriter LA36 at 15 or 30 cps; MSI terminals at 15 or 30 cps	600	300
Conversational terminals supported	Most ASCII terminals at up to 1200 bps, Zeta, Calcomp, Tektronix, Telex, TWX, foreign exchange (FX)	Most ASCII terminals at up to 1200 bps, Zeta, Calcomp, Tektronix, Telex, TWX, foreign exchange (FX), Hewlett Packard	MSI terminals at 15 or 30 cps	ASCII or EBCDIC terminals at 10 to 120 cps; Houston Instruments, Calcomp, Tektronix, Zeta & other plotters; IBM 2780 and compat.	ASCII 10-120 cps or Correspondence terminal
Batch terminals supported	2000 to 4800 bps; up to 9600 bps via private line; Data 100, DEC PDP-11, IBM 2780/3780 and compatible units	2000 to 4800 bps; up to 9600 bps via private line; Data 100, DEC PDP IBM 2780/3780 & compatible units, IBM HASP	MSI terminals at 15 or 30 cps	—	All IBM compatibles
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC, APL, COBOL, Assembler, SNOBOL	FORTRAN, BASIC, APL, COBOL, Assembler, SNOBOL	CSC proprietary language	FORTRAN, BASIC, COBOL, GMAP, PL/1	APL, WYLBUR, CICS, CMS, TSO
Batch-mode programming languages	FORTRAN, BASIC, APL, COBOL, Assembler, SNOBOL	FORTRAN, BASIC, APL, COBOL, Assembler, SNOBOL, PL/1	COBOL, FORTRAN	BAS, COB, FORT, PL/1, GMAP, all conversational lang. can be used in bkgd (rem. batch) mode	COBOL, FORTRAN, PL/1, Assembler, BASIC, PASCAL, ALGOL
Principal applications	Business, scientific, & data base management	Business, scientific, data base management, & administrative	Accounting, distribution, manufacturing, tax preparation	Business & scientific, corporate modelling, investment banking, lighting design, mining & telecommunications applications	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$150	Contact vendor for pricing	Contact vendor for pricing	\$100	\$100
Remote batch	\$150			\$100	\$100
Terminal connect time:					
Interactive	\$9.50-27.00/hr.	—	—	\$3.00-12.00/hr.	\$5.00-10.00/hr.
Remote batch	None	—	—	None	\$7.50/hr.
Central processor time:					
Interactive	\$0.31-0.61/SRU	—	—	\$0.04-0.23/CRU*	\$1.17-2.00/CPU sec.
Remote batch	\$0.13-0.25/SRU	—	—	\$0.03-0.12/CRU*	\$1.17/CPU sec.
Mass storage:					
Interactive	\$0.033/2048 chars./day	—	—	\$0.90-1.20/4096 std. chars./month	\$1.38/track/month
Remote batch	\$0.033/2048 chars./day	—	—	\$0.90-1.20/16,384 binary chars./month	\$1.38/track/month
<b>COMMENTS</b>	Matrix pricing enables user to optimize costs; volume discounts for committed volumes; specializing in services for business, government, banking, natural resources and communications industries; affiliated with Computer Sciences Corporation	Charges for remote batch use vary with priority; lower rates for non-prime time use; subscription storage and high-volume discounts; pricing options available; a variety of DDP configurations available for high-volume applications; also services the marketing industry, gov't. agencies; graphics available	Formerly a division of ITEL Corporation	Complete customer support services, with industry specialists in financial reporting and planning, investment banking, data mgmt., energy/environment, computer-aided design tools & telecomm; design & programming services available *CRU (Computer Resource Unit) is a function of CPU time, core size used, and quantity of I/O	Offers IDMS, SPSS, SAS, SAS-GRAF, SAS-ETS, IMS, DYLA KOR, BIOMED, QUAIL, SIMSCRIPT, MARK IV, EASYTRIEVE, and other software packages; ACF 2 security system available; offers systems, software consulting; branch offices in LA, NYC, SF, Chicago, Boston, Atlanta, & Sunnyvale

## All About Time-Sharing and Remote Computing Services

COMPANY	Computone Systems, Inc.	Comshare, Incorporated	Comshare Limited	CONCAP Computing Systems	Control Data Cybernet Services
<b>GENERAL</b>					
Name of service	KEYPACT	Commander II	Commander I, Commander II, CPV	CONCAP Civil Engineering	NOS Computing Service, Cyber 200 Computer Service
Date operational	Dec. 1965	1967	1969	1965	1963
Areas currently served	US and Canada	U.S., Canada, United Kingdom, The Netherlands, Belgium, West Germany, France, Japan, access through TELENET	Local dial-up throughout major Canadian trading areas with int'l communications to US and Europe	United States, Canada, and areas serviced by TELENET Communications	Entire U.S., Canada, Mexico, S. Africa, Europe; Brazil, Israel, Australia, Venezuela, Japan, Taiwan, Hong Kong, Singapore, and New Zealand
<b>EQUIPMENT</b>					
Computers	IBM 360/65, IBM 4341	Xerox Sigma 9 (19) in Ann Arbor, MI and Sigma 9 (20) in London	Xerox Sigma 9 (3) in Toronto	PDP-11/45, PDP-11/34, LSI-11/23	40+ large-scale Control Data computers in 20+ worldwide centers
No. of simultaneous users	100	675	Over 200	10	Approximately 3500
Conversational terminals supported	All ASCII at 30 or 120 cps	ASCII compatible terminals up to 120 cps; also graphics terminals	Any ASCII terminal up to 120 cps; also graphic terminals	ASCII terminals at 10 or 30 cps; in-house installations up to 9600 bps	Any ASCII terminal at 10 or 30 cps; Correspondence terminals at 14 cps; most ASCII at 120 cps
Batch terminals supported	—	IBM 2780 & 3780, and compatible units	IBM 2780, IBM HASP, Data 100	—	Various RJE terminals at 2000 to 9600 bps; supports CDC Mode 4A (200UT), 2780/3780, and HASP multi-leaving protocols
<b>SOFTWARE</b>					
Conversational programming languages	COBOL, FORTRAN, RPG	FORTRAN, COBOL, BASIC	FORTRAN, BASIC, COBOL, APL, Assembler, PASCAL	FORTRAN	FORTRAN, BASIC, COBOL, APL, PASCAL
Batch-mode programming languages	—	FORTRAN, COBOL	FORTRAN, COBOL, BASIC, APL, Assembler, PASCAL	—	FORTRAN, BASIC, COBOL, ALGOL, COMPASS, PASCAL
Principal applications	Financial, insurance, agriculture	Public acctg., data base mgmt., human resource mgmt., telephone systems mgmt., financial analysis & modeling, trust mgmt. & graphics	Business & scientific	Engineering	Manuf., construction, utilities, petroleum, mining, engineering, scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$25-\$30	See Comments	None	\$2.50-200.00	\$100
Remote batch	—	—	None	—	None
Terminal connect time:					
Interactive	\$1.20/minute	—	\$12.00-28.80/hr.	\$8.00-18.00/hr.	\$9.00-41.00/hr.
Remote batch	—	—	\$20.40-26.40/hr.	—	\$20.00/hr.
Central processor time:					
Interactive	—	—	\$0.10-0.13/CCU*	\$0.012-0.22/CCU	\$0.40/sec.
Remote batch	—	—	\$0.05-0.18/CCU*	—	\$0.09-0.30/sec.
Mass storage:					
Interactive	Contact vendor	—	\$0.005-\$0.020/2048 chars./day	\$0.03/512 chars./day	\$0.016/1280 chars./day
Remote batch	—	—	\$0.005-\$0.020/2048 chars./day	—	\$0.016/1280 chars./day
<b>COMMENTS</b>					
	Dedicated system for life insurance sales, feed and meat formulation, and turnkey market information	Service includes international datacomm via TELEGRID network; client training and documentation; usage charges vary with priority, time of day and resources used; other packages offered include market research, survey analysis & data entry capabilities	Offers service in all major Canadian cities via TELEGRID network; an affiliate of Comshare, Inc. with international data communications to U.S. and Europe  *CCU (Comshare Computer Unit) is a load-independent measure of all significant system resources actually utilized	Specialties are civil and structural engineering, and land surveying, including automated plotting services for subdivision design. Company also installs minicomputer systems, complete with engineering and graphics software	Also see The Service Bureau Company, a division of Control Data Corporation

## All About Time-Sharing and Remote Computing Services

COMPANY	CSG Keydata Division	CSG Multiple Access Division	CSG Processing Services	Cybershare Limited	Data Resources Inc.
<b>GENERAL</b>					
Name of service	Keydata	CDC Service	IBM Service	Cybershare	—
Date operational	1969	1969	1972	July 1972	1969
Areas currently served	Canada	All of Canada and U.S.	All Canada, Eastern & Western U.S.	Canada and US	US, Canada, Western Europe, plus other international locations via Tymnet
<b>EQUIPMENT</b>					
Computers	DECsystem 10 (1), Univac 494 (3) in Foxboro, MA	Cyber 720, Cyber 174 in Don Mills, Ontario	IBM 370/168 (2) with A/P & EF, IBM 3033 (2), Amdahl V5 in Calgary	CDC Cyber (171's (2), Honeywell 66/40	Several Burroughs B7800 multiprocessor systems
No. of simultaneous users	1000	144 (Interactive); 64 (Batch)	Over 1000	512 time-sharing, 200+ remote batch	Over 500
Conversational terminals supported	TTY Model 28, GE TerminiNet, Vucom, ADDs, DECwriter, Tally, Datapoint	All compatible ASCII & TTY terminals at 10, 30, and 120 cps	All compatible ASCII, EBCDIC, & TTY terminals; IBM 2741	TTY 33/35 and compatible units; any ASCII at 110 to 1200 bps	All ASCII terminals at speeds to 120 cps; IBM 2741
Batch terminals supported	—	All CDC 200 UT & IBM 2780/3780 (BSC protocol) compatible terminals	IBM 2780/3780, HASP protocols, HASP multileaving SNA	CDC 200, IBM 2780/3780, IBM HASP	IBM 2780/3780, Burroughs DC 1100, or equivalent units
<b>SOFTWARE</b>					
Conversational programming languages	Keydata On-line Processing Language (KOP 111)	COBOL, BASIC, APL, FORTRAN, PASCAL	COBOL, FORTRAN, TSO, WYLBUR	FORTRAN, BASIC, APL, Text Editor, COBOL	FORTRAN, BASIC, APL, ALGOL, plus proprietary langs. (EPS, FILETRAN, DRISCAN)
Batch-mode programming languages	—	COBOL, FORTRAN, BASIC, COMPASS, PASCAL	COBOL, FORTRAN, PL/1, RPG, Assembler	FORTRAN, COBOL, COMPASS, PL/1	FORTRAN, ALGOL, COBOL, plus proprietary langs. (EPS, FILETRAN, DRISCAN)
Principal applications	Business	Engineering, scientific, financial modelling, business	Business, financial, & government	Business & scientific Business, engineering, & scientific	Business, scientific, & financial
<b>CHARGES</b>					
Min. monthly charge:	\$1000	—	—	None	\$250
Interactive	—	—	—	None	\$250
Remote batch	—	—	—	—	—
Terminal connect time:	—	\$4.50-14.00/hr.	\$11.00-13.00/hr.	\$8/hr.	\$16.50-24.75/hr.
Interactive	—	\$16.50-22.00/hr.	\$8.50-22.00/hr.	\$10.00-15.00/hr.	\$30.00/hr.
Remote batch	—	—	—	—	—
Central processor time:	—	\$0.70/resource unit	\$38.00/minute	\$0.22/SRU	\$0.06-0.165/CRU*
Interactive	—	\$0.25-0.60/res. unit	\$19.33/minute	\$0.08-0.20/SRU	\$0.06-0.14/CRU*
Remote batch	—	—	—	—	—
Mass storage:	—	\$0.19/block/month	\$1.20/million bytes allocated/day	\$0.005-0.01/1280 chars./day	\$0.0023-0.03/1000 chars./day
Interactive	—	—	\$3.80/million bytes/connect hour	\$0.005-0.01/1280 chars./day	\$0.0023-0.03/1000 chars./day
Remote batch	—	\$9.30/block/month	Service levels allow user to specify service required; volume and commitment discounts, as well as for overnight and weekend processing and low speed national networks; terminal and customer facilities in all branch locations; full range of shared software	—	Specializes in economic and financial planning and analysis; offers Economic Information Systems at charges of \$4,000 to \$100,000 per year; other specialties are a vast assortment of economic and financial data bases, including commodities, stock price information, econometrics and modeling
<b>COMMENTS</b>	All charges are based on number of transactions processed; dedicated system for interactive business data processing applications	Terminal and customer facilities in all branch locations; extensive engineering and scientific software library; high speed links between processors give all users on-line access to the computer systems network	Service levels allow user to specify service required; volume and commitment discounts, as well as for overnight and weekend processing and low speed national networks; terminal and customer facilities in all branch locations; full range of shared software	—	*CRU (Computer Resource Unit) is a measure of overall system throughput

## All About Time-Sharing and Remote Computing Services

COMPANY	Data-Tek Corporation	Datacrown Inc.	Dataline Systems Limited	Datalogics, Inc.	Dialcom Inc.
<b>GENERAL</b>					
Name of service	Data-Tek Corp.	Shared Processing	Dataline Time-Sharing Network	DL/OS	Timesharing
Date operational	1971	June 1972	1969	1969	July 1970
Areas currently served	Northeastern U.S.	All of Canada and U.S.	All of Canada and U.S.	Ohio, Illinois, New York, & Pennsylvania	Nationwide and 27 foreign locations
<b>EQUIPMENT</b>					
Computers	HP 3000 Series III	Equivalent of 12 IBM 370/168s in Ontario	DECsystem-1070 (1); DECsystem-1090 (5)	Honeywell Sigma 7's in Cleveland	Prime 750 (11), Prime 850, Honeywell 1648A (9)
No. of simultaneous users	48 users at 1200 bps	Over 500	400	Approx. 100	Over 2000
Conversational terminals supported	All ASCII terminals	IBM 2741, 3270; TTY and compatible units	All ASCII terminals at 10 or 120 cps	TTY and other ASCII terminals at 10, 30, or 120 cps; IBM 2741	All ASCII, EBCDIC and correspondence terminals at 10 or 30 cps; IBM 2741
Batch terminals supported	IBM HASP	IBM 2780/3780, HASP and compatible units	IBM 2780/3780, IBM 3741 and equivalent units	IBM 2780 and compatible units using HASP protocol	—
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC, COBOL, SPL	APL, PL/1, WYLBUR, FORTRAN, COBOL, Assembler, SCSS	FORTRAN, BASIC, COBOL, APL, MACRO, SIMULA	FORTRAN, BASIC, COBOL, APL, Text, Proforma	FORTRAN, BASIC, COBOL, RPG, Text Editor
Batch-mode programming languages	FORTRAN, RPG, SPL, COBOL	FORTRAN, COBOL, PL/1, RPG, Assembler, Mark IV	FORTRAN, COBOL, RPG, BASIC, MACRO, SIMULA	FORTRAN, APL, BASIC, COBOL, RPG, Meta-symbol	—
Principal applications	Statistics, HMO, payroll, health care, accounting	Business, scientific, & government	Business, statistical, engineering, financial	Business; financial & statistical	Business, scientific, electronic mail, correspondence management, newswire, executive scheduling
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$25	\$250	Contact vendor for pricing	None	\$25.00-100.00
Remote batch	\$25	\$250		None	—
Terminal connect time:					
Interactive	\$13.00/hr.	\$3.00-6.60/hr.	—	\$10.00-18.00/hr.	\$7.00-10.00/hr.
Remote batch	\$13.00/hr.	\$6.60-13.20/hr.	—	Variable	—
Central processor time:					
Interactive	\$0.08/sec.	\$39.20/CPU min.	See Comments	\$0.08/CRU	\$0-0.02/CPU
Remote batch	\$0.08/sec.	\$39.20/CPU min.	See Comments	\$0.04-0.16/CRU	—
Mass storage:					
Interactive	\$0.10/256 chars./month	\$0.013/track/day (IBM 3350)	—	\$0.80/2048 chars./month	\$0.10-1.00/1K chars./month
Remote batch	\$0.10/256 chars./month	\$0.013/track/day (IBM 3350)	—	\$0.80/2048 chars./month	—
<b>COMMENTS</b>					
	Offers municipal bonds program; port rates available; offers special programs related to health care; HMO organizations and Methadone treatment centers; turnkey systems; TSRO; company also OEM's Hewlett-Packard systems with specialized payroll software	Offers discounts for volume usage and non-prime time; dedicated high-speed access ports available; DB/DC services and COM available; integrated batch and interactive; includes extensive shared software library  Note: Datacrown has recently merged with Systems Dimensions Limited (SDL)	CPU charges vary with amount of main storage used; reduced rates for non-prime time usage; discounts for volume usage; major software systems include Business Accounting, Modelling, and Data Management	"Virtual port" and fixed price contracts available; offers discounts for volume usage and non-prime time; fund accounting; Municipality package offered; financial and statistical analysis software	Special rates available for large data bases and dedicated ports

## All About Time-Sharing and Remote Computing Services

COMPANY	Ecotran Corporation	Electronic Data Systems	Financial Data Systems Inc.	General Electric Information Services Company	Genesee Computer Center, Inc.
<b>GENERAL</b> Name of service	Timesharing, Remote Batch, Typesetting	EDS	FDS Online Financial System	MARK III Service	Genesee Services
Date operational	May 1968	1962	1970	1965	Aug. 1968
Areas currently served	Nationwide (principally Midwest); European access via Telenet	Entire U.S. (109 cities); 9 foreign countries	Continental U.S.	Local-call service to more than 600 cities in North America, and Far East, Western Europe, Australia, Venezuela, Saudi Arabia	Entire U.S., Canada, Europe, Mexico, Brazil, Israel, Australia, Taiwan, Japan, S. Africa
<b>EQUIPMENT</b> Computers	Univac 1100/60, & DEC 2060 in Cleveland	A total of 74 mainframes (Amdahl, IBM, Univac, Burroughs & others) plus numerous small computers in 5 regional data ctrs. No practical limit	ASA 5000, CDC (3), IBM 4341, NAS 7000, CCD Omega Mod 3	Honeywell L66 and IBM 370/3033 computers in 3 supercenters in Ohio, Maryland, & Europe	CDC 6600, 7600, and Cyber 175 belonging to Control Data (Cybernet); GENESSEE/NDS Distributed Processing System
No. of simultaneous users	48 on 2060; 128 on 1100/60	No practical limit	Not specified	Approx. 200 per computer	Not specified
Conversational terminals supported	Most ASCII- & EBCDIC-compatible terminals up to 120 cps	IBM 3278, ITT Courier, plus Raytheon, Harris & Trivex models	IBM 1050/1060/2740/2980/3270/3600/3780; Burr. TC 700/TU 700/TU 1700; BR 2001; TRW; NCR 270; Olivetti TC 800; DataSaab; etc.	ASCII, EBCDIC, or Correspondence Code terminals at 10, 14.8, 15, 30, and 120 cps; Touch-Tone	GENESSEE/NDS; all ASCII-compatible terminals at 10, 30, or 120 cps
Batch terminals supported	Most batch terminals at up to 9600 bps	IBM 2030/3777/4300, plus Harris & others	—	IBM 2780/3780, Data 100, MDS 2400, RCP 702, Honeywell G-115, etc., at 2000-4800 bps	GENESSEE/NDS, CDC 200, DEC PDP-11 & PDT-11, IBM 1130, Univac 9200/9300, Data 100, etc.
<b>SOFTWARE</b> Conversational programming languages	BASIC, FORTRAN, COBOL, EDIT, SAM, APL	APL, BASIC, FORTRAN, DATACOM, ROSCOE, TSO, TEXTEDITOR	COBOL, Dial 260, FORTRAN, Easytrieve, BAL	FORTRAN, BASIC, ALGOL	FORTRAN, COBOL, Compass, BASIC, APL
Batch-mode programming languages	FORTRAN, BASIC, ALGOL, COBOL, RPG, etc.	COBOL, FORTRAN, PL/1, RPG, DIBOL, BASIC	COBOL, FORTRAN, BAL, Dial 260, Easytrieve	FORTRAN, COBOL, PL/1	FORTRAN, COBOL, Compass, BASIC, ALGOL, SIMSCRIPT, SIMULA
Principal applications	Engineering, scientific, phototypesetting, management sciences, educational	Health care, insurance, financial institutions, gov't. services energy, retailing, distribution	On-line thrift account processing and interactive distributed processing	Business & scientific	Engineering & scientific (optics and mechanical engineering)
<b>CHARGES</b> Min. monthly charge:					
Interactive	\$25	Contact vendor for pricing	See Comments	See Comments	None
Remote batch	\$25		—	—	None
Terminal connect time:					
Interactive	\$10.00/hr.	—	—	—	\$9.00-28.00/hr.
Remote batch	\$7.00-10.00/hr.	—	—	—	\$12.00-18.00/hr.
Central processor time:					
Interactive	See Comments	—	—	—	\$0.38/SBU
Remote batch	See Comments	—	—	—	\$0.11-0.49/SBU
Mass storage:					
Interactive	\$0.42/7168 char./month	—	—	—	\$0.0125/1000 chars./day
Remote batch	\$0.42/7168 char./month	—	—	—	\$0.01/1000 chars./day
<b>COMMENTS</b>	Charges vary based on volume, time of day, commitment period, and computer utilized; Ecotran Corporation encompasses all services previously provided by Chi Corporation; Ecotran's divisions include ADECS, CHI, ECOCENTERS, and ECOSYSTEMS	Offers travel agents tickets processing package, microfilm processing, data base management, DATAPREP, & NOW accounts processing	Serves savings and loan associations and mutual savings banks; charges based on number of accounts on file; extensive support of thrift industry	CPU costs depend on priority, time of day, and resources used; network access costs depend on speed and access plan selected, and are based on characters transmitted and/or terminal connect time; custom usage subscription discounts, COM service, and data management facilities are also available	GENESSEE/NDS Distributed Processing System includes the Genesee Data Entry Module, which assists unsophisticated users in preparing input for any applications program; the Genesee/NDS also includes sync. comm. capability and software with cost savings over interactive communications

## All About Time-Sharing and Remote Computing Services

COMPANY	GTE Data Services Incorporated	HDR Systems, Inc.	Honeywell Information Systems, Inc.	Informatics Inc.	Information Consultants, Inc.
<b>GENERAL</b>					
Name of service	RCS	HDR Systems	Datanetwork	Data Services Operations	ICI
Date operational	Nov. 1971	1972	July 1972	1972	June 1974
Areas currently served	Continental U.S. plus Hawaii	Central U.S. and Texas, Continental U.S.	Entire U.S.; local service in most large cities plus INWATS service	Continental U.S.	Continental U.S.
<b>EQUIPMENT</b>					
Computers	CDC 6500, 6600, and Cyber 73-28 (2); triple Honeywell 8/70	Control Data, CDC Cyber 170/730	Multiple Honeywell 66/ 6000 systems; each system at least three- processor configura- tion or better	Intel AS/6 (2), IBM 370/158, IBM 370/168	DECsystem 2050 (2)
No. of simultaneous users	150	512 (110-9600 bps)	256 per system	250	256
Conversational ter- minals supported	TTY & compatible ter- minals at 10, 15, 30 & 120 cps	Most interactive terminals (ASCII com- patible, IBM 2741, etc.)	IBM 2741 at 15 cps; TTY; ASCII terminals at 10, 15, 30 or 120 cps; graphics terminals	All major 10, 15, 30 or 120-cps terminals; Tektronix graphics terminals	ASCII, EBCDIC or correspondence terminals at 10, 15, 30 or 120 cps; Tektronix
Batch terminals supported	CDC 200 & compatible units at 2000 to 9600 bps	CDC 200, IBM HASP, IBM 2780/3780, 3270	IBM 2780/3780, and GRTS-compatible	IBM 2780/3780 & HASP workstations and equivalents	IBM 2780/3780 and compatible at 1200 to 9600 bps
<b>SOFTWARE</b>					
Conversational pro- gramming languages	FORTRAN, BASIC, APL, Text Editor	FORTRAN, APL, BASIC, COBOL, PASCAL	FORTRAN, DATABASIC, BASIC, APL, ALGOL, PASCAL, SOVIAL	FORTRAN, COBOL, BASIC, APL, PL/1, Assembler	FORTRAN, COBOL, BASIC, APL, PL/1, ALGOL
Batch-mode program- ming languages	FORTRAN, BASIC, COBOL, Simgscript, Compass	FORTRAN, COBOL, APL, BASIC	FORTRAN, COBOL, ALGOL, PASCAL, JOVIAL, GMAP, APL	FORTRAN, COBOL, PL/1, Assembler	FORTRAN, COBOL
Principal applications	Business, scientific, engineering, financial modeling	Sales analysis, mgmt. reporting, data base mgmt., stat. analysis, finan. modeling, project mgmt., engi- neering	Business, scientific, engineering, data base management	General business planning and control	Financial, data management, planning, text processing, interactive graphics, on-line SPSS
<b>CHARGES</b>					
Min. monthly charge:	See Comments	—	\$200	\$100	None
Interactive	—	—	\$200	\$100	None
Remote batch	—	—	—	—	—
Terminal connect time:	—	\$6.00-13.00/hr.	\$15.00/hr.	\$6.00-18.00/hr.	\$6.00-12.00/hr.
Interactive	—	\$10.00-20.00/hr.	None	\$15.00/hr.	\$12.00-18.00/hr.
Remote batch	—	—	—	—	—
Central processor time:	—	\$0.09-0.10/SRU*	\$0.12/TSU*	\$0.10/IRU*	\$0.00667-0.01/CRU*
Interactive	—	\$0.06-0.07/SRU*	\$0.12/RBU*	\$0.10/IRU*	\$0.00667-0.01/CRU*
Remote batch	—	—	—	—	—
Mass storage:	—	—	\$0.065-0.45/320 words/month	\$18-35/212K bytes/mo.	\$0.01/640 chars./day**
Interactive	—	—	\$0.065-0.45/320 words/month	\$18-35/212K bytes/mo.	\$0.01/640 chars./day**
Remote batch	—	—	—	—	—
<b>COMMENTS</b>	Offers general time- sharing services plus large library of applica- tions; principally serves GTE Corpora- tion; prices nego- tiable per contract	Consulting assistance in commercial educa- tional and governmental areas  *SRU (System Re- source Unit) is a func- tion of I/O, central memory, central proc- essor time, and applications surcharges	DATANETWORK services are accessible 24 hours per day, seven days per week, except for scheduled preventive maintenance; Non-prime time and volume discounts are available  *TSU includes processor time charges; RBU includes processor time charges and certain types of data transfer charges	Many general tools for financial analysis and planning; infor- mation management and graphics  *IRU includes CPU usage, I/O usage, connect time, and disk storage	Financial modeling and data base management packages; special ser- vices for public and private data base owners; files up to 2 billion char- acters  *CRU (Computer Re- source Unit) is based on central processor and I/O usage **Bulk storage rates available

## All About Time-Sharing and Remote Computing Services

COMPANY	Information Science Inc.	Information Systems Design, Inc.	Insurance Processing Services	Interactive Market Systems, Inc.	Interactive Sciences Corporation
<b>GENERAL</b>					
Name of service	InSci/80	ISD	Remote Computing Service	IMS	Computing service
Date operational	Feb. 1978	May 1968	1972	Dec. 1969	May 1968
Areas currently served	Entire U.S.	Entire U.S. via INWATS (batch) and Tymnet (interactive)	Entire U.S. & Canada	Worldwide	Entire U.S., Europe, Far East, Hawaii, Australia
<b>EQUIPMENT</b>					
Computers	Microdata 6000 & 8000	Univac 1100/82 (1) and Univac 1108 (3) in Santa Clara, CA	Burroughs 6810 (1), plus Mohawk mini-computers in Oakbrook, IL	DEC 2050 in New York	DECsystem-10 (6) in Braintree, MA
No. of simultaneous users	32 per CPU	200+	150	Not specified	62 per system
Conversational terminals supported	TTY-compatible CRTs at up to 120 cps	TTY and compatible ASCII terminals at 10, 30 or 120 cps; IBM 2741; Tektronix graphics terminals	All Burroughs terminals including IBM compatible	All major 300 and 1200 bps terminals	All ASCII to 1200 bps; IBM, other BCD, Selectric, correspondence units via Telenet
Batch terminals supported	—	IBM 2780, 1130; Data 100, Harris, MDS, Univac 1004 Unitech, HASP	Same as interactive	—	IBM 2780/3780 and compatible units
<b>SOFTWARE</b>					
Conversational programming languages	BASIC	FORTRAN, BASIC, COBOL, APL, Editor, Assembler	COBOL, FORTRAN	A proprietary English-type language	FORTRAN, COBOL, BASIC, MACRO, PASCAL, AID, LISP, SNOBOL
Batch-mode programming languages	—	FORTRAN, BASIC, COBOL, APL, Editor, Assembler	COBOL, FORTRAN, RPG	A proprietary English-type language	FORTRAN, COBOL, BASIC, RPG, MACRO, PASCAL, LISP, AID, SNOBOL
Principal applications	Personnel	Engineering, scientific, graphics, data base mgmnt., electronics, structural analysis	Insurance industry	Advertising and media industry	Business, scientific, financial, engineering, data base mgmnt., cash mgmnt.
<b>CHARGES</b>					
Min. monthly charge:	\$800	\$50	Contact vendor for pricing	None	\$50
Interactive	—	\$50	—	None	\$50
Remote batch	—	\$12-15/hr.	—	See comments	\$11.00-20.00/hr.
Terminal connect time:	—	\$12-15/hr.(2K/4.8K bps)	—	See comments	\$20.00-40.00/hr.
Interactive	—	\$0.09-0.36/sec.	—	See comments	\$0.01/CRU (Prime)
Remote batch	—	\$0.09-0.36/sec.	—	See comments	\$0.007-0.0025/CRU
Central processor time:	—	\$0.05/10,752 chars./day	—	See comments	\$0.013/1000 chars./day
Interactive	—	\$0.05/10,752 chars./day	—	See comments	\$0.013/1000 chars./day
Remote batch	—		—		
<b>COMMENTS</b>	Charges based on file volumes and number of locations supported; minimum charge includes CRT, printer, modem, and 2 hrs. connect time per day; free WATS line; special reporting and database customization services are available at an additional cost	Discounts for volume and non-prime time use; applications include remote and interactive graphics, structural, electrical and nuclear engineering, simulation, operations research, project control, etc.	On-line casualty insurance system, employee benefit claims admin. system, workman's compensation claims admin. system, formwriter, diary, & alpha inquiry system	IMS offers online programs & services to the advertising community; uses syndicated & proprietary data (SMRB, ARB), offering R&F, Optimization, cost-ranking, cross-tab as well as specialized programs for broadcast, print & agency groups; also offers System-4 for media appl. & Graph-Pac for color graphics; charges range from \$55.00 to \$132.00 per resource hour depending on the program utilized; IMS offers free documentation, training	Financial modeling programs, accounting systems, statistical analysis, data base management; discounts for non-prime users; ISC is a division of National Data Corporation

## All About Time-Sharing and Remote Computing Services

COMPANY	Keydata Corporation	Litton Computer Services	Litton Mellonics Information Center	Management Concepts, Inc.	Management Systems Corporation
<b>GENERAL</b>					
Name of service	Keydata	Timesharing and Remote Job Entry	MIC	MCI	TMS
Date operational	1965	Aug. 1971	1968	1971	June 1969
Areas currently served	Continental U.S. & Canada; more than 40 concentrators	Continental U.S. & Canada	Principally southern California, with nationwide access via Telenet network	Atlanta, GA	Inter-mountain west (primary); U.S.
<b>EQUIPMENT</b>					
Computers	DECSYSTEM-10 (1), Univac 494 (3) in Foxboro, MA	IBM 370 Model 3033 in Reston, VA	IBM 3033 (2) in Canoga Park, CA; operating system is MVS/JES2	Prime 400, Prime 750	IBM 370/155 (1), NAS AS/5 (3) in Salt Lake City
No. of simultaneous users	1000	512	200 users (both time-sharing and batch) at 110 to 9600 bps	64 at 1200 bps	2500
Conversational terminals supported	TTY Model 28, GE TermiNet, ADDS, DEC-writer, Tally, Datapoint at 30 or 120 cps	TTY-compatible units; IBM 3270	IBM 3277, 3278, 3279, 2741; TTY 33, 35, 43; Miscellaneous ASCII terminals	Teletype 33; ASCII at 1200 bps	IBM 3270, 2780 & others
Batch terminals supported	—	IBM HASP, 2780, 3780, & emulators	IBM HASP/JES workstations; IBM 2780 & 3780 (bisync); IBM 3776 & 3777 (SDLC), System 3, System 6, 6670	—	All
<b>SOFTWARE</b>					
Conversational programming languages	Keydata On-Line Processing Language (KOP III)	FORTRAN, BASIC, COBOL, APL, PL/1, MARK IV	FORTRAN, COBOL, BASIC, APL	FORTRAN, COBOL, BASIC	APL, BASIC, COBOL, FORTRAN, PL/1, SAS
Batch-mode programming languages	—	FORTRAN, COBOL, PL/1, RPG, MARK IV, Easytrieve	FORTRAN, COBOL, PL/1, RPG, PASCAL, LISP/Reduce	FORTRAN, COBOL, RPG	COBOL, FORTRAN, PL/1, RPG, Easytrieve
Principal applications	Business	Business, scientific, data base management, financial & statistical	Business, scientific, & engineering	Commercial, accounting	Trucking, payroll, financial, scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$800	None	None	\$329	\$100
Remote batch	—	None	None	\$200	Same
Terminal connect time:					
Interactive	See Comments	\$8.00-15.00/hr.	\$4.00-11.00/hr.	\$6.00-9.00/hr.	See Comments
Remote batch	—	\$15.00/hr.	—	—	See Comments
Central processor time:					
Interactive	See Comments	\$0.0573/Computer Sec*	\$2.70/CRU	\$0.58-0.85/sec.	\$0.56/SRU (\$0.27/sec.)
Remote batch	—	\$0.0573/Computer Sec*	\$1.80/CRU	—	\$0.56/SRU (\$0.27/sec.)
Mass storage:					
Interactive	See Comments	Contact vendor	\$0.17/track/day	\$0.0825-0.15/1000 chars.	Contact vendor
Remote batch	—	Contact vendor	\$0.17/track/day	—	—
<b>COMMENTS</b>	All charges are based on number of transactions processed; dedicated system for interactive business data processing applications	Rates vary with amount and period of time resources used  *Computer Second usage is computed using a formula that takes into account memory usage, I/O access, and other factors	Litton offers "Backup" Computer Disaster Recovery Service to the western U.S. for a minimum monthly fee of \$4,000; IBM 3081 installation is due 4th qtr. 1981; MIC offers data base management, CICS, IMS, IDMS, TOTAL & RAMIS		Terminal connect time: \$63.00/mo. (1200 bps); \$263.00/mo. (19.2K bps); dedicated mass storage charges: \$2,500/drive/mo. (3330), \$4,990/mo. (3350), or \$0.015/cyl. (13K bytes/day); COBIS (trucking pkge.) handles front-office operations

## All About Time-Sharing and Remote Computing Services

COMPANY	Mark/Ops	Martin Marietta Data Systems	Martin Marietta Data Systems	McDonnell Douglas Automation Co. (McAuto)	McDonnell Douglas Automation Co. (McAuto)
<b>GENERAL</b> Name of service	Mark/Ops	MMDS IBM Services	Cyber 700 Service	CYBER Service	370 Service
Date operational	March 1967	1971	Jan. 1981	March 1976	1967
Areas currently served	Northeastern U.S.	Continental U.S., Alaska, U.K.	U.S., D.C., Alaska, Hawaii	Entire U.S. and foreign countries via Tymnet	Continental U.S. and Canada; customers also in U.K., Europe, and Japan
<b>EQUIPMENT</b> Computers	DECSYSTEM-10 (2) & DEC PDP-11/45	IBM 370/168, IBM 4341 (2), IBM 3033 (7) in Orlando, FL	CDC Cyber 170/730, Cyber 170/750 (2)	CDC Cyber 173 & 175 (4)	IBM 3033 (8) in St. Louis; IBM 3033 (9) in CA
No. of simultaneous users	64 & 24	600 (110-56K bps)	386 (110-9600 bps)	110 per system	100+ per system
Conversational ter- minals supported	Any 110 or 300 bps ASCII unit	ASCII at 110, 300, 600, 1200 bps; IBM 3270 emulators	TY, 2741, APL	IBM 2741 and TTY 33 compatible units, graphics terminals	IBM 3741, 3270, graphics
Batch terminals supported	Any 1200 bps ASCII unit	IBM HASP, 2770, 2780, 3780, 3741, System/3, IBM workstation OS, SVS, MVS, DOS	CDC 200 UT, HASP	CDC 200, IBM HASP, others through 370 service	IBM 2770, 2780/3780, HASP and compatible units
<b>SOFTWARE</b> Conversational pro- gramming languages	FORTRAN, BASIC, COBOL, TECO, MAGIC II	FORTRAN, BASIC, COBOL, APL	APL, BASIC, COBOL, FORTRAN, PASCAL, COMPASS	FORTRAN, BASIC, APL, MIMDAC, COBOL, SYSTEM 2000	FORTRAN, COBOL, BASIC, PL/1, IMS/PL-1, SYSTEM 2000
Batch-mode program- ming languages	FORTRAN, COBOL, BASIC+	FORTRAN, PL/1, COBOL, RPG, APT	COBOL, FORTRAN, PASCAL, ALGOL, COMPASS	FORTRAN, COBOL, MIMAC, SIMSCRIPT, BASIC, APL	FORTRAN, COBOL, PL/1, RPG, DL/1, BAL, MRCS
Principal applications	Acctg., distribution, financial modeling, assembly control, engr.	Acctg., manuf., distrib., financial, engineering, scientific, personnel, claims, benefits, project control	Engineering, scientific, numerical modeling, energy, data mgmt.	Engineering, scientific, graphics, data base management	Business, manufac- turing, engineering, graphics, data base mgmnt., insurance
<b>CHARGES</b> Min. monthly charge: Interactive	None	Contact vendor for pricing	Contact vendor for pricing	None	None
Remote batch	None			None	None
Terminal connect time: Interactive	\$3.00-10.00/hr.	—	—	\$6.00-24.00/hr.	\$6.00-24.00/hr.
Remote batch	\$3.00-10.00/hr.	—	—	\$9.00-20.00/hr.	\$9.00-20.00/hr.
Central processor time: Interactive	None	—	—	\$0.10-0.20/MRU	\$4.50-9.00/VRU
Remote batch	None	—	—	\$0.15-0.50/MRU	\$3.50-7.50/VRU
Mass storage: Interactive	\$0.50/1K chars./mo.	—	—	\$0.045/64 wds/wk.; \$3.50/6848 wds/wk.	\$12.50/M bytes/wk.
Remote batch	\$0.50/1K chars./mo.	—	—	\$0.045/64 wds/wk.; \$3.50/6848 wds/wk.	\$12.50/M bytes/wk.
<b>COMMENTS</b>	Division of Northeastern Systems Associates; specializes in systems for specific applica- tions; lower rates for data bases; different rates apply for PDP-11/ 45 system; bulk storage available at special rates; general library for financial and statistical programs	Enhanced TSO service, WYLBUR, Structured Programming Facility, graphics, disk files are shared between batch and interactive services, disk file security system, access to multiplicity of applications, IMS, CICS, SYS 2000, Total, EasyTrieve	Central processor charges are in SRU, an algorithmic com- bination of central processor usage, memory usage and data transfer to on- line peripherals	Storage discounts are offered; disk files are shared between com- puters; full access to 370 McAuto service is provided; fully integrated batch and interactive service; large turnkey CAD/ CAM systems also available; McAuto offers Structured System Analysis methodology	Full TSO service; interactive debug; structured Program Facility; RJE; graphics; full access to other McAuto services

## All About Time-Sharing and Remote Computing Services

COMPANY	Monchik Weber Corporation	Monchik Weber Wall Street Concepts Inc.	National Computer Network of Chicago, Inc.	National CSS, Inc.	National Data Corporation
<b>GENERAL</b>					
Name of service	Data Sharing Service	STAR	—	VP/CSS	Merchandising Data Exchange
Date operational	May 1981	June 1970	Dec. 1969	Dec. 1968	1966
Areas currently served	New York, NY; Chicago, IL	Northeastern U.S.	Continental U.S., Canada; worldwide via Tymnet	Continental U.S., Canada, U.K., France	National plus 44 countries
<b>EQUIPMENT</b>					
Computers	Data General S/140s	HP 3000 III	DECsystem 20, Honeywell 1648A (2)	IBM 3033-U8, Amdahl V-8, IBM 370/168 in Stamford, CT; Amdahl V6-II, in California	DEC PDP-10 (7), PDP 11/70 (7), TI 990s, Univac 494 (4), Univac 1100 (2), Data General 130 (29)
No. of simultaneous users	Not specified	15 at 2400 bps	Not specified	1500 (mixed modes)	Not specified
Conversational terminals supported	Any RS-232-C standard device	All types	All ASCII at 10, 30 or 120 cps; IBM 2741	TTY and all compatible terminals at 10, 15, 30, 60 or 120 cps; plus voice response, graphics, and 3270	Any ASCII or EBCDIC low speed to 1200 bps, RJE to 9600
Batch terminals supported	—	—	—	IBM HASP, 1130, 2780, 3780, 3740; dial-up 2000, 2400, 4800 bps; leased line to 9600 bps	Univac 200, Univac 400, IBM 2780/3780
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN	COBOL	FORTRAN, COBOL, BASIC, MAX BASIC, APL, PASCAL, MACRO, SNOBOL	FORTRAN, APL, BASIC, COBOL, PL/1, PASCAL	BASIC, COBOL, FORTRAN
Batch-mode programming languages	—	COBOL	FORTRAN, COBOL	FORTRAN, APL, BASIC, COBOL, PL/1	COBOL, FORTRAN
Principal applications	Financial modeling	Financial, accounting, invest banking	Business, financial, stocks/commodities data base options; portfolio analysis; statistics plus others	Business, database, engineering, financial modelling, market research, information management	Merchandising services, money transfer systems, pharmacy credit, data base mgmt., T/S
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$1,500 (\$500 usage)	Contact vendor for pricing	None	\$100 per account	See Comments
Remote batch	—	—	None	None	—
Terminal connect time:					
Interactive	\$0.30/min. (9am-5pm)	—	\$5-10/hr.	\$12.00-20.00/hr.	—
Remote batch	—	—	—	None	—
Central processor time:					
Interactive	\$0.15/min. (5pm-12pm)	—	\$1.20-2.00/CPU min.	\$0.23/ARU	—
Remote batch	—	—	—	\$0.09-0.138/ARU	—
Mass storage:					
Interactive	\$15.00/1000 blocks*	—	\$0.75/1K chars./mo \$1.00/2560 chars./mo.	\$0.73/cylinder/day with volume discounts	—
Remote batch	—	—	—	\$0.73/cylinder/day with volume discounts	—
<b>COMMENTS</b>	Provides access to "real time" stock market prices and special theoretical valuation programs as an optional feature  *10,000 blocks included in minimum charge		Maximum cost for DEC 20 CPU time is \$25.00/hr.; cost for terminal connect time varies between prime and non-prime connect times; volume discounts and unlimited usage rates available; other available packages include engineering, distribution, scientific	Offers NOMAD data base management and reporting systems; full range of graphics services; output to microfiche; TEXT MASTER text management system; FINAL forecasting, financial modelling, securities, DB, reporting system; screen editor, format, operations research, market research; TWX, TELEX; customer educ.; RESPOND Personnel Mgmt. System	Charges based on transaction rates for all services except on-line pharmacy & time share (T/S at standard unit); can be tied into nationwide real time voice and transaction network for order

## All About Time-Sharing and Remote Computing Services

COMPANY	National Information Services, Inc.	NLT Computer Services Corp.	Ohio Valley Data Control, Inc.	On-Line Business Systems, Inc.	Online Computer Library Center
<b>GENERAL</b>					
Name of service	—	Datafile	Ohio/Kanawha Valley Data Control	See Comments	OCLC
Date operational	1978	1970	1966	1969	1971
Areas currently served	Western U.S. & other areas in U.S. via Tymnet	Entire U.S.	Southeast Ohio and West Virginia	Continental U.S. (California headquarters)	All 50 states plus Canada and U.K.
<b>EQUIPMENT</b>					
Computers	DecSystem 20 (3) in Cupertino, CA	Burroughs B 4800, B 4700, DG NOVA 3 (4)	Burroughs B4800, B4700, B3700, B1800 (2); DEC PDP 11/34 & DECSYSTEM-10	IBM 370/158 (2) attached processors in San Fran.; IBM 3033, IBM 4341 in Santa Clara	Xerox Sigma 9 (6); plus Tandem & DEC equipment
No. of simultaneous users	96 (30 & 120 cps)	500	100 (medium systems); 15-50 (small systems)	1000	Not specified
Conversational terminals supported	All ASCII up to 1200 bps	Up to 9600 bps, Hazeltine, others	DEC-compatible terminals	All IBM-compatible terminals	Beehive 100/105; Ramtek 110
Batch terminals supported	—	Not specified	Burroughs B 1700/1800, Honeywell 2020 Series	All IBM-compatible terminals	—
<b>SOFTWARE</b>					
Conversational programming languages	BASIC, COBOL, FORTRAN, SAIL, MAINSAIL, SIMULA	Dependent on specific application	DIBOL	FORTRAN, BASIC, COBOL, APL, WYLBUR, Assembler, SUPER-WYLBUR	—
Batch-mode programming languages	COBOL, FORTRAN, RPG	COBOL; not available to user	COBOL	FORTRAN, COBOL, PL/1	—
Principal applications	Business, data base, financial modeling	Distribution, accounting	Financial & small business systems	Custom on-line & batch services, distribution acctng., personnel mgmt., business, engineering, manuf., financial & others	Library applications
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$250	\$1,000	\$200	Contact vendor	Contact vendor for pricing
Remote batch	—	—	—	—	—
Terminal connect time:					
Interactive	\$6-10 hr. (pr.); \$4-6	—	\$10.00/hr.	Contact vendor	—
Remote batch	—	—	—	—	—
Central processor time:					
Interactive	\$0.08/second	—	\$140.00/hr. (dedicated)	—	—
Remote batch	—	—	\$25.00/hr. (medium system)	—	—
Mass storage:					
Interactive	\$0.02/page	—	\$25.00/100K bytes/mo.	—	—
Remote batch	—	—	—	—	—
<b>COMMENTS</b>	TEX-computer typography; HUB-teleconferencing	Monthly charge up to \$20,000; dependent on transaction volume; matrix pricing and inventory management for wholesale distributors; also markets in-house minicomputer with same application software	Strong experience and support in bank applications with remote job entry terminal computers and on-line applicational terminals; fast developing small business systems applicational terminal support system; asset accounting, dairy route settlement packages available	On-Line Business Sys. gained entrance into the remote computing field with its initial offering. Development & Processing of On-line Custom Systems, in 1969; the firm has recently expanded its facilities and in Oct. 1980 began its General Timesharing Service; a new service, Personnel, Benefits & Claims Processing, became available in May, 1981	On-line systems for libraries and other information centers; packages include cataloging, serials control, interlibrary loan, circulation control & acquisition

## All About Time-Sharing and Remote Computing Services

COMPANY	On-Line Systems, Inc.	On-Line Systems, Inc.	Optimum Systems Incorporated	Polycom Systems Limited	PRC Computer Services
<b>GENERAL</b> Name of service	OLS DEC Services	OLS/370 Services	Time Sharing Services	DTSS, VAX	Timesharing, Remote Computing Service
Date operational	1967	June 1976	1967	1968	1968
Areas currently served	Continental U.S. and Canada	Continental U.S.; world-wide access through commercial networks	Continental U.S., incl. Alaska, Hawaii, P.R. & worldwide via Tymnet	Canada	U.S. and Europe
<b>EQUIPMENT</b> Computers	DECSYSTEM-10 (18) in Pittsburgh, PA	National AS/6 (2) in Pittsburgh, PA	IBM 370/3033 and IBM 370/168 (3) in Rockville, MD	Honeywell 6060, DEC VAX-11/780	Itel AS/5, Itel AS/6
No. of simultaneous users	70 per system	150	48 bisync (2K-9.6K bps); 304 async (0-1200 bps)	200	Not specified
Conversational terminals supported	ASCII, EBCDIC, Correspondence, TTY, 2741-types, Tektronix, etc.	ASCII, EBCDIC, & Correspondence compatibles	ASCII, EBCDIC, TTY, Correspondence, IBM 2741 compatible and 3270 full screen compat.	Any ASCII-compatible terminal up to 4800 bps	TTY, IBM 2741, and compatible ASCII and EBCD units at 10, 15, 30, and 120 cps
Batch terminals supported	IBM 2780 & 3780 types	Virtually any type	IBM 2780/3780, Data 100 & compatible units	Any terminal supporting IBM 2780, 3780, or SDLC protocol	IBM 2780/3780, HASP, and compatible units
<b>SOFTWARE</b> Conversational programming languages	APL, BASIC, COBOL, FORTRAN, MACRO	APL, BASIC, COBOL, FORTRAN, Assembler, PL/1	SUPERWYLBUR, WYLBUR, BASIC, COBOL, FORTRAN	FORTRAN, COBOL, BASIC, PL/1	FORTRAN
Batch-mode programming languages	COBOL, FORTRAN, APL, BASIC	COBOL, FORTRAN, PL/1, RPG, Assembler	COBOL, FORTRAN, SUPERWYLBUR	FORTRAN, COBOL, BASIC, PL/1	FORTRAN, Easytrieve, COBOL, PL/1
Principal applications	Financial, banking, project management, sales & marketing, project management, data base management	Accounting, financial modelling, econometrics, engineering, statistics, data base management	Mathematical, statistical and scientific, text editing (SUPERWYLBUR)	Acct'g., order proc., job costing, financial planning, statistics, engineering	Data base management, information retrieval, statistical
<b>CHARGES</b> Min. monthly charge:					
Interactive	\$10.00/user number	\$100	Contact vendor	\$150	None
Remote batch	\$10.00/user number	\$100	—	\$150	None
Terminal connect time:					
Interactive	\$13.50/hr.	\$13.50/hr.	Contact vendor	\$6.00-12.00/hr.	Varies
Remote batch	—	\$8.00/hr.	—	\$12.00-21.00/hr.	None
Central processor time:					
Interactive	\$0.07/CPU*	\$0.20/SRU*	—	\$0.19-0.42/CRU	Varies
Remote batch	\$0.07/CPU*	\$0.10/SRU*	—	\$0.19-0.42/CRU	Varies
Mass storage:					
Interactive	\$0.05/PSU**/day	\$69.00/cylinder/mo.	—	\$0.15/1000 chars./mo.	\$0.035/track/day
Remote batch	\$0.05/PSU**/day	\$0.0153/track/day	—	\$0.15/1000 chars./mo.	\$9.75/cylinder/month
<b>COMMENTS</b>	On-Line Systems, Inc. is a United Telecom Company  *CPU—Central Processing Unit **PSU—Program Storage Unit	A two-way link between the VM conversational and the MVS batch system; volume discounts available  *SRU (System Resource Unit) includes CPU time, I/O access and royalties for proprietary software	Owns and markets SUPERWYLBUR for word processing, text editing, and RJE services; provides CICS, TSO, SUPERWYLBUR interactive services; batch services and RJE through TSO, SUPERWYLBUR; volume discounts for mass storage; leased line access available	Pricing for terminal connect and CPU time varies according to non-prime and prime time usage; 40% discount available during non-prime time; dedicated ports available	Offers remote batch processing, TSO time-sharing, DBMS (ADABAS, Central Software), graphics, use of ADA SCRIPT, ADACOM, ADAMINT, NATURAL, BMD, BMDP, SAS, SPSS, SCSS, & EasyTrieve

## All About Time-Sharing and Remote Computing Services

COMPANY	Profitool, Inc.	Programs & Analysis, Inc.	Proprietary Computer Systems, Inc.	Proprietary Computer Systems, Inc.	Pryor Corporation
<b>GENERAL</b>					
Name of service	Contractor Mgmt Information Service	Thrift Line Service	PCS/Computernet	PCS/TEXT	RC/BASIC
Date operational	Oct. 1967	1968	Oct. 1970	1970	June 1969
Areas currently served	Continental U.S.	New England, New York, & Southeast	U.S.; Europe	U.S.; Europe	Midwest
<b>EQUIPMENT</b>					
Computers	Prime 400, Prime 550, Prime 150	Honeywell 6060 in Burlington, MA	IBM 3031; (370/158 (2) backup	IBM 370/158 (2); 3031 backup	DEC system 2050 in Chicago
No. of simultaneous users	126	64	Not specified	Not specified	128
Conversational terminals supported	All ASCII at 300 and 1200 bps	ASCII at 10 to 120 cps; IBM 2741 and compatible units for higher speeds	Most hardcopy and video terminals at 15, 30 and 120 cps	Most hardcopy and video terminals at 15 and 120 cps	DEC 36, DEC III, Hazeltine 1550, DEC 2060, DEC 2020
Batch terminals supported	—	Most terminals at up to 9600 bps	IBM 2780/3780, HASP & compatible units	IBM 2780/3780, HASP and compatible units	—
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC	FORTRAN, BASIC, ALGOL	APL	PCS/TEXT	FORTRAN, BASIC, COBOL
Batch-mode programming languages	FORTRAN	FORTRAN, COBOL, Assembly, Jovial	FORTRAN, COBOL, PL/1, Assembler	PCS/TEXT	—
Principal applications	Construction industry	General business, accounting, graphics, and other specialized applications	Statistics, engineering, data base mgmt., financial modeling	Publication production in all business and government applications	Mfg., Dist.
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	See Comments	\$300/mo.	\$300.00/mo.	None
Remote batch	—	—	\$500/mo.	Negotiated	—
Terminal connect time:					
Interactive	\$12.00/hr.	See Comments	\$17.00-24.00/hr.	\$5.75-10.75/hr.	\$6.00/hr.
Remote batch	—	—	\$12.00/hr.	—	—
Central processor time:					
Interactive	\$0.04/CPU	See Comments	\$0.012 CRU*	\$0.006/process unit	\$0.16/sec.
Remote batch	—	—	\$14.00 CRU + \$0.17/2K	—	—
Mass storage:					
Interactive	\$0.10/1000 chars./mo.	—	\$0.012/1000 chars./day	\$0.28/psr/mo.	\$0.0033/1000 chars./day
Remote batch	—	—	\$0.017/track/day	—	—
<b>COMMENTS</b>	50% discount available on terminal connect and processor time during non-prime time; data processing services and software for construction industry exclusively	Offers dedicated business, engineering, and scientific data processing services; prices are contingent upon type of application and/or computer resource requirements	Higher-level "programmerless programming" procedures for financial modeling and data base management systems; users can call prewritten Fortran or Assembler language routines as subroutines of APL programs  *CRU—A measure of CPU time including I/O access	PCS/TEXT is an online word processing and information management system; features include automatic index and table of contents, document formatting, sorting, arithmetic operations, data creation, and photo-composition	Specializes in remote processing of billing, accounts receivable, sales analysis, payroll, inventory control, and accounts payable; also mfg. order processing, bill of material processing, and raw material requirements planning

## All About Time-Sharing and Remote Computing Services

COMPANY	Quanex Management Sciences	Rapidata, Inc.	Remote Computing Corporation	Reynolds and Reynolds	Ross Systems, Inc.
<b>GENERAL</b>					
Name of service	Remote Computing Services	Rapidnet	Timesharing Services, MERLIN, SLP, YMS, JUPITER	VIM II/Dealer Management Systems	MAPS/INTAC
Date operational	Aug. 1977	1967	Oct. 1968	1963	1974
Areas currently served	United States, various overseas locations	U.S., U.K.	Continental U.S. via local dialing	U.S., Canada	Worldwide via TYMNET
<b>EQUIPMENT</b>					
Computers	Itel AS/5, 7031 in Southfield, Michigan	Honeywell 437 (13), DECsystem-1070 (3), DECsystem-1080, and DECsystem-2020	Burroughs B 7700 (2), Burroughs 4800	BTI 5000s, Burroughs	DEC PDP 11/70 (3), DEC VAX 11/780 (4), in Palo Alto, CA
No. of simultaneous users	256	500	200	31	Over 200
Conversational terminals supported	IBM 3270	Most terminals to 120 cps unit	Most ASCII units at 10 to 120 cps, Correspondence/EBCD units at 14.8 to 120 cps	See Comments	Any ASCII terminal up to 120 cps
Batch terminals supported	IBM HASP, IBM 2780/3780, 2770 and compatible units; Datapoint	Most terminals to 4800 bps	Data 100, IBM 2780 and emulators, Singer M&M, Burroughs DC 1000	—	IBM 2780/3780 or equivalent
<b>SOFTWARE</b>					
Conversational programming languages	O-W-L	FORTRAN, BASIC, COBOL, DBMS, and proprietary	FORTRAN, PL/1, BASIC, COBOL, ALGOL	BASIC, COBOL	COBOL, FORTRAN, BASIC, MAPS, INTACT (proprietary languages), PASCAL
Batch-mode programming languages	FORTRAN, COBOL, PL/1, RPG, ASI-ST	FORTRAN, COBOL, BASIC, and proprietary	FORTRAN, PL/1, BASIC, COBOL, ALGOL, Work Flow (WFL)	—	—
Principal applications	Accounting and financial systems	Financial	Business; thrift, securities & commodities, data bases	Dealer/distributor business applications	Financial planning and control systems*
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$275	\$100	\$100	\$400/application	None
Remote batch	\$275	\$100	\$100	\$250/application	None
Terminal connect time:					
Interactive	Contact vendor for pricing	\$7.00-32.00/hr.	Contact vendor for pricing	Contact vendor for pricing	\$7.60-9.50/hr.
Remote batch	—	—	—	—	\$5.50/hr.
Central processor time:					
Interactive	—	\$0.033-0.11/CPU	—	—	\$0.108-0.165/CPU
Remote batch	—	\$0.033-0.11/CPU	—	—	\$0.081-0.10/CPU
Mass storage:					
Interactive	—	\$0.10-0.60/1000 chars./month	—	—	\$0.05-0.25/512 chars./month
Remote batch	—	—	—	—	\$0.05-0.25/512 chars./month
<b>COMMENTS</b>	Fully integrated accounting and financial packages; volume discounts available	Several data bases available for market statistics, stock markets, finance, economics, banking, international trade data, etc.; also offers voice response and graphic plotting	Charges shown are for B 7700 system with discounts for non-prime time; application packages include: SLP-Financial Planning Service; MERLIN-database of commodities, options, securities; LMS—Liquidity Management System; JUPITER—Mortgage Loan Services; also being offered is "RECOVERY," a disaster recovery service serving the U.S., employing Burroughs computers (7700 (2) & 4800)	Conversational terminals supported include: Reynolds & Reynolds TC-1000; TI 820, 742, 743, 763; GE 200, 1200, 1232; TTY ASR 33; Lear Siegler ADM-3; Oakleaf SX 330	Remote computing and management consulting services focused on financial planning and reporting systems; supplier of DEC-based timesharing systems for in-house use in large operations
					*Within medium to large organizations

## All About Time-Sharing and Remote Computing Services

COMPANY	Rotelcom Data, Inc.	Scientific Computers, Inc.	Scientific Process & Research, Inc.	The Service Bureau Company	Shared Medical Systems, Inc.
<b>GENERAL</b>					
Name of service	Remote Computing Service	—	SPR Timesharing System	CALL/370 Management Time Sharing	Financial Management, ACTION, COMMAND, Med-Verse 1969
Date operational	Apr. 1980 (date commercially available)	1960	1969	1969 (CALL/360)	
Areas currently served	Northeastern U.S.	Continental U.S.	USA/Canada—world-wide via Telenet	Local access in 163 U.S. & 35 International locations, including Europe, Canada, Far East, Australia, and Puerto Rico	Nationwide network excluding Hawaii
<b>EQUIPMENT</b>					
Computers	DEC PDP 11/70, DEC PDP 11/34 in Rochester, NY	NAS AS/5 (2)	Prime 400, Prime 550	IBM 370/158 (12), IBM 3031 (2), CDC Omega 480 (2)	IBM 370/168 (2), IBM 3033 (2)
No. of simultaneous users	40	70	64	Over 160/system	Over 500
Conversational terminals supported	Any ASCII terminal at 10, 30 or 120 cps	IBM 3767, Harris, IBM 3270	ASCII terminals at 30 cps	IBM 2741, TTY 33/35, and ASCII terminals at 10, 30, or 120 cps	IBM 3770, Digital Equipment, Four-Phase
Batch terminals supported	—	—	—	IBM 2780/3780 or equivalent; IBM S/360 & S/370 processors	—
<b>SOFTWARE</b>					
Conversational programming languages	BASIC, FORTRAN, DMS, RDIFMS	Assembler, COBOL	FORTRAN, BASIC, COBOL	FORTRAN, BASIC, PL/1, Data Management, APL	Remote job entry; time-sharing option
Batch-mode programming languages	—	Assembler, COBOL	—	FORTRAN, BASIC, COBOL, PL/1, Data Management	Not applicable
Principal applications	Financial modeling & budget cont., record mgmt., docu. retrieval (litigation), optics, inventory control	Manufacturing, distribution, insurance, direct mail	Engineering, scientific and business	Business, manufacturing, financial modelling	Hospital accounting, administrative, patient care, & communications
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$3.00	See Comments for pricing info.	None	\$100	—
Remote batch	—	—	—	—	—
Terminal connect time:					
Interactive	\$4.00-12.00/hr.	—	\$6.00-10.00/hr.	\$11.00-16.00/hr.	—
Remote batch	—	—	—	\$30.00/hr. (2400 bps)	—
Central processor time:					
Interactive	\$0.15-0.30/kilo-core min	—	\$0.006-0.01/RAM	\$0.21/PU*	—
Remote batch	—	—	—	\$0.02-0.10/PU*	—
Mass storage:					
Interactive	\$0.05-0.15/512 chars./month	—	\$0.015/1000 chars./day	\$0.015-0.022/1000 bytes/day	—
Remote batch	—	—	—	\$0.006/1000 bytes/day	—
<b>COMMENTS</b>					
	Rotelcom Data, Inc. is a subsidiary of Rochester Telephone Corp.; their timesharing service has been operational internally for 3 years; most of Rotelcom's applications are oriented towards the telecommunications industry; other Rotelcom services include sales of terminals, modems, & other data comm products, and turnkey small business systems for accounting applications based on DEC computers	Totally leased line on-line system; charges billed on a unit rate basis depending on application package utilized	Compounding optimization, statistical solutions to processing & research problems, screw design for extruders & molding machines, die design for plastics processing	A Control Data company since January 1973; also offers TSO, RJE, On Call/Plus, remote computer service under OS/VS2 (MVS)  *Processing Unit	An integrated information system for hospitals in the areas of communications, patient care, financial processing, health care, and physician's billing, information handling (WP)

## All About Time-Sharing and Remote Computing Services

COMPANY	I.P. Sharp Associates Limited	Sigma Data Computer Corporation	A.O. Smith Corporation	Statistical Tabulating Corporation	STSC, Inc.
<b>GENERAL</b> Name of service	Sharp APL	Datalive/Datagraf	Network Information Services	STAT-TAB	APL*PLUS Service
Date operational	July 1969	Jan. 1980	1969	Spring 1972	1969
Areas currently served	Local access in over 400 cities with 56 branch offices in Canada, U.S., Europe, Australia, & Far East	Nationwide	Continental U.S. & international via Telenet	Continental U.S.; dial-up access at 75 to 96.2K baud; leased lines available	Local access in more than 300 cities worldwide, with 25 offices in U.S. and Europe
<b>EQUIPMENT</b> Computers	Amdahl 470/V6, Amdahl 470/V8 (2)	Data General Eclipse MV/8000 (2), DEC VAX for Datalive; IBM 370/168 for Datagraf	IBM 370/165-II, Amdahl 470/V6-II	IBM 370/158 (2) in Chicago	Amdahl 470/V6 (1), IBM 370/168 (1) in Bethesda, MD
No. of simultaneous users	350	60 (Datalive); 300 (Datagraf)	Over 200	200	Over 450
Conversational terminals supported	Asynchronous units up to 1200 bps, including ASCII (e.g., AJ 832), IBM 2741 compatible, Tektronix, HP CRT's, etc.	Any standard ASCII terminal (Datalive); Tektronix 4010/4014/4027 (Datagraf)	TTY 33/35, Tektronix CRTs, Sycor 250, IBM 3270 & 2741, and compatible units; others	All IBM-compatible hard-copy & CRT terminals; TTY 33/35 & compatible units	Any asynchronous ASCII & EBCDIC units up to 1200 bps; IBM 2741, 3767 at 14.9 cps
Batch terminals supported	—	—	IBM HASP, IBM 3780, and all BSC, JES II and compatible units; others on request	All IBM-compatible units	IBM 2780/3780, HASP, & System/3; Data 100, Harris, Sycor, Four-Phase, etc.
<b>SOFTWARE</b> Conversational programming languages	APL	Special applications languages	FORTRAN, COBOL, PL/1	CMS- and TSO-supported languages	APL, COBOL, FORTRAN, BASIC, PL/1, VS/APL (under VM only)
Batch-mode programming languages	APL	—	FORTRAN, COBOL, PL/1	FORTRAN, COBOL, PL1, RPG, ADPAC, Assembler	All System/370
Principal applications	Business, scientific, financial modelling, manufacturing, banking	Library automation, graphics, stat. analysis, procurement	Manufacturing, banking (EFT), engineering, financial modeling, graphics	Business & scientific	Financial management
<b>CHARGES</b> Min. monthly charge:					
Interactive	None	\$250 (Datalive); None	\$100	Contact vendor for pricing	\$100
Remote batch	None	—	\$100	—	—
Terminal connect time:					
Interactive	\$1.00/hr.	\$5/hr. (Datalive)*	\$5.00-28.00/hr.	—	\$12.00-24.00/hr.
Remote batch	—	—	\$5.00-25.00/hr.	—	—
Central processor time:					
Interactive	\$0.40/CPU unit	\$0.5/unit; \$.072-.192	\$0.0656/CRU*	—	\$0.10/CRU
Remote batch	\$0.20-0.30/CPU unit	—	\$0.0375/CRU*	—	Greater of \$10 or \$0.10/CRU
Mass storage:					
Interactive	\$0.70/256K bytes/day	See Comments	\$0.02/1K bytes/month	—	\$10.00/million bytes/day
Remote batch	\$0.70/256K bytes/day	—	\$0.007/1K bytes/month	—	—
<b>COMMENTS</b>	Provides in-house Sharp APL installations, consulting and education services, and mini-computer-based systems for real time and process control; over 60 on-line data bases; user-program dev. assistance offered by I.P. Sharp Assoc. Special Systems Division	Mass storage charge: for Datalive—\$.05/512 chars./mo.; Datagraf—\$.048—1.56/disk storage unit (212K bytes); also, \$.020/printed page  Datagraf offers access to gov't. databases (census, health, environmental & space science)  *Datagraf terminal connect time: \$6.00-\$26.00/hr.	Offers on-line and batch services under MVS, TSO and JES II; EFT switching network available; DOS capabilities through UCC-II/ DUO; volume and non-prime time discounts available  *CRU (Computer Resource Unit) accounts for resources used, including CPU, memory, I/O operations, job setup, & proprietary software royalties	System runs under MVS and VM/370; emulation of any IBM software/hardware combination is supported	Offers consulting and programming of custom applications; APL*PLUS File Sub-system to process shared files and large volumes of data; on-line and background processing under VM/CMS, OS/MVT, other packages include electronic mail, compliance reporting, construction accounting, gas and oil accounting, materials management planning

## All About Time-Sharing and Remote Computing Services

COMPANY	Sun Information Services Company	Sun Information Services Company	Sun Information Services Company	System Development Corporation	System Development Corporation
<b>GENERAL</b>					
Name of service	INTERCOM	TSO, WYLBUR	VM/CMS	Commercial Services	SDC
Date operational	Sept. 1977	Sept. 1977	Jan. 1981	1972	1971
Areas currently served	U.S.	U.S.	U.S.	North America	North America (Claims Admin. Svc.); world-wide (Search Svc.)
<b>EQUIPMENT</b>					
Computers	CDC Cyber 750	IBM 370/168 MP, 3033	IBM 4341 (2) in Dallas, TX	Burroughs B5500 (3), B6700 (2), B 6800 (2)	Amdahl V7 (1) in Santa Monica, CA
No. of simultaneous users	20	180	75-90	Not specified	No practical limit
Conversational terminals supported	GE TermiNet 300, Sycor 340 & TI 725/735/745	ASCII-compatible, IBM 2741/3270, SDLC compatible	SNA stations IBM 327X and IBM 81XX; AJ630, Excuport 300, GE300, TI, Univac DCT 300	Burroughs TD872, Burroughs AP310	IBM 3270-type (Claims Admin. Svc.); most asynchronous terminals (Search Svc.)
Batch terminals supported	IBM 2780/3780 IBM HASP, Harris 1100/1600, Sycor 340, CDC 200	IBM 1130/2780/3741/3777/3780/360/20/22, System/7, HASP, Data 100 70/76/78; Harris 1280/1600; PDP-11/45; Sycor 340; Nova	Same as SIS MVS Service (via RSCS MVS/RJE link)	—	—
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC	FORTRAN, COBOL	APL, BASIC, COBOL, FORTRAN, PL/1	COBOL, Burroughs Assembler	COBOL, PL/1
Batch-mode programming languages	FORTRAN	FORTRAN, COBOL, PL/1 BAL	COBOL, FORTRAN, PL/1	COBOL, Burroughs Assembler	COBOL
Principal applications	Scientific, engineering	Program development	DBMS, financial, modeling, bus. graphics, stat. analysis, econometrics	Hospital services	Employee health claims administration; bibliographic search & retrieval
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	None	—	\$4.50/patient bed day	Contact vendor for pricing
Remote batch	None	None	—	—	—
Terminal connect time:					
Interactive	\$12.00/hr.	\$14.00/hr.	\$12/hr. (prime); \$10	—	—
Remote batch	\$10 (2000 bps)-15/hr.	\$10-15 (4800 bps)/hr.	—	—	—
Central processor time:					
Interactive	\$0.075/system sec.	\$5.58/CWU	\$0.15/VMU*(prime);0.12	—	—
Remote batch	\$0.050/sys.sec.(4800bps)	\$2.48/CWU (4-hr. resp.)	\$0.15/VMU* (prime); 0.105	—	—
Mass storage:					
Interactive	\$0.30 storage unit/month	\$0.065/MSU/week	\$0.65/MSU (10K chars.)/week	—	—
Remote batch	\$0.30 storage unit/month	\$0.065/MSU/week	\$0.65/MSU (10K chars.)/week	—	—
<b>COMMENTS</b>					
			Discounting schemes available; online "help" facility; on-line documentation hotline telephone service; auto. file backup; FORT, COB interactive debugger; RSCS link to MVS/NJE; script text processor; full split-screen text editor; exec 2 command procedures		SDC Claims Administration Service automatically administers the complete process of employee health claims; SDC Search Service is an information retrieval service with access to 65+ bibliographic databases
			*VMU=Virtual Machine Unit (CPU time + I/O counts)		

## All About Time-Sharing and Remote Computing Services

COMPANY	Technical Advisors, Inc.	Tel-A-Data, Inc.	Teledata, Inc.	Telstat Systems, Inc.	Timesharing Consultants, Inc.
<b>GENERAL</b>					
Name of service	TECH-MAC	Tel-A-Data, Inc.	Teledata Timesharing Services	Telac	TCI Timesharing Services
Date operational	June 1967	1966	1976	1981	Aug. 1976
Areas currently served	Continental U.S. except Alaska (toll-free except in Michigan)	State of Florida	Entire U.S. and abroad via Telenet	U.S.	North America
<b>EQUIPMENT</b>					
Computers	Varian 622i (2), 1 in Wayne, MI, and 1 in Phoenix, AZ; plus PDP-11/70 in Wayne, MI	Burroughs B2835 in Miami, FL	DTSS on Honeywell 66/07 in Lebanon, NH	Xerox Sigma 9, Sigma 6	DECsystem-20s in Tucson, AZ
No. of simultaneous users	20 in Wayne, 5 in Phoenix	100 at 9600 bps	100	52 (10 to 120 cps)	60
Conversational ter- minals supported	TTY 33/35 & other ASCII terminals at 10 or 30 cps	Burroughs TD & TC, TTY, Harris, Hazel- tine, S.R.I., All conversational	All ASCII asynchronous terminals and IBM 2741 at 10, 15, 30, or 120 cps	Any ASCII terminal	All ASCII
Batch terminals supported	—	None	IBM 2780 and compatible units	IBM HASP, IBM 2780/ 3780	IBM 2780/3780
<b>SOFTWARE</b>					
Conversational pro- gramming languages	FORTRAN	BASIC, COBOL, FORTRAN	APL, BASIC, COBOL, FORTRAN, PL/1	FORTRAN, ANS FOR- TRAN, EXTENDED FOR- TRAN IV, COBOL, BASIC, APL, RGP, METASYM.	FORTRAN, COBOL, BASIC, APL, SAIL, PAS- CAL, SNOBOL, LISP
Batch-mode program- ming languages	—	—	APL, BASIC, COBOL, FORTRAN, PL/1	FORTRAN, ANS FOR- TRAN, EXTENDED FOR- TRAN IV, COBOL, BASIC, APL, RPG, METASYM.	FORTRAN, COBOL, PASCAL, SNOBOL, LISP, SAIL
Principal applications	Civil engineering & surveying	Accounting for wholesale applica- tions	Business, retailing, engineering, financial modelling	Financial, mathematical	Engineering, statistical, accounting, financial modelling, data base management
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	\$1,500	\$50	Contact vendor	\$25.00
Remote batch	—	—	\$50	Contact vendor	\$25.00
Terminal connect time:					
Interactive	\$10-28/hr. (10 cps)	Depends on contract	\$7.00-25.00	Contact vendor	\$3.50-17.00/hr.
Remote batch	\$15-36/hr. (30 cps)	—	\$7.00-25.00	Contact vendor	\$3.50-17.00/hr.
Central processor time:					
Interactive	None	—	\$0.08-0.11/CRU*	Contact vendor	\$0.175-0.25/CPU sec.
Remote batch	—	—	\$0.06-0.10/CRU*	Contact vendor	\$0.175-0.25/CPU sec.
Mass storage:					
Interactive	\$10.00/2000 chars./ month	—	\$1.40/4096 chars./ month	Contact vendor	\$0.015/2560 chars./ day
Remote batch	—	—	\$1.40/4096 chars./ month	Contact vendor	\$0.015/2560 chars./ day
<b>COMMENTS</b>	Offers specialized service for civil engineers and surveyors only; plotter available for \$45/hour	Main emphasis is on invoicing, accounts receivable, statistical reports, and inventory control	Interactive and batch services available to all terminals; strong financial and retailing applications; data link to IBM hardware; Teledata, Inc. is a wholly- owned subsidiary of Reap, Inc., a batch retail servicer  *CRU (Computer Re- source Unit) is a composite of CPU, I/O, and core	Provides access to Teleprice/80 databank for automatic retrieval of securities pricing and related information; Automated Portfolio Performance Measure- ment Services available; GNMA full information service; dual computer configuration offers 100% hardware redundancy; system includes large in-house library of FORTRAN subroutines; contact vendor for pricing	Financial modelling us- ing ADR's EMPIRE data base management with Software House's 1022; access through TYM- NET, TELENET, and TCI communications net- works; Hydrologic Engi- neering Center (HEC) programs available for civil engineers; OEM for DEC hardware; dis- counts available for usage above \$1000

## All About Time-Sharing and Remote Computing Services

COMPANY	Timesharing Management, Inc.	Time Sharing Resources, Inc.	Time Sharing Resources, Inc.	TLG Computing Services, Inc.	Tymshare, Inc.
<b>GENERAL</b>					
Name of service	Timesharing	Business Management Decision Support Service	TOTAL/APL	Remote Processing	TYMCOM IX, X, & 370
Date operational	December 1978	1973	July 1970	Jan. 1969	1966
Areas currently served	Greater Boston area and nationwide via Telenet	Local access in all major cities in U.S., and major cities worldwide	Local access in all major U.S. metropolitan areas, and major cities worldwide	Central U.S., Texas	Offices throughout U.S.; local access from major metropolitan areas throughout U.S., as well as Western Europe and Japan
<b>EQUIPMENT</b>					
Computers	DEC PDP/11 systems in Cambridge, MA	IBM 370/158s in Hauppauge, NY	IBM 370/158s in Hauppauge, NY	IBM 360/65, IBM 4331 in Louisville, KY	More than 50 IBM, Amdahl, DEC, Honeywell and Xerox mainframes, plus mid-range & mini-systems; centers in CA, PA, & TX
No. of simultaneous users	Up to 255	320	180	Not specified	Not specified
Conversational terminals supported	ASCII, EBCDIC, IBM 2741 type; all Telenet-compat. terminals	IBM 2741 or equivalent; all ASCII terminals	IBM 2741 & equivalent units; all ASCII terminals	Any 3270-compat. or ASCII terminal up to 300 bps	Any ASCII, EBCDIC, or Correspondence unit at 10, 15, 30 or 120 cps in full or half duplex mode
Batch terminals supported	—	IBM 2780/3780, Data 100 or equivalent	IBM 2780/3780, Data 100, & equivalent units	Any HASP-compatible RJE terminal, IBM 2780/3780/3620	IBM 2780/3780 and compatible units
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC, APL, COBOL, PASCAL, RPG, BASIC-plus	APL, BASIC, COBOL, FORTRAN, all IBM compatible	APL	APL, BASIC, COBOL, FORTRAN	FORTRAN, BASIC, COBOL, PL/1, APL, SAIL, FOCUS, and others
Batch-mode programming languages	—	COBOL, FORTRAN, PL/1, RPG, all IBM compatible	—	COBOL, FORTRAN, PL/1, RPG	FORTRAN, BASIC, APL, COBOL, PL/1, SAIL, FOCUS, and others
Principal applications	Tax modeling, general timesharing	Financial, general business	Financial & general business	Accounting, graphics, cross-industry	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$10	—	None	\$300	—
Remote batch	—	—	None	Same	—
Terminal connect time:					
Interactive	See Comments	\$13.00-24.00/hr.	\$14.00-24.00/hr.	\$12.00-15.00/hr.	\$8.00-25.00/hr.
Remote batch	—	—	—	\$12.00-15.00/hr.	—
Central processor time:					
Interactive	No charge	\$0.25/CRU	\$0.11/CRU*	Contact vendor	\$0.09-0.16/TRU*
Remote batch	No charge	—	—	—	—
Mass storage:					
Interactive	\$0.03/block (512 chars./month)	\$1.00/million bytes/day depending on vol.	\$11.00/million bytes per day	Contact vendor	\$0.10-0.45/1000 chars./mo.
Remote batch	—	—	—	—	—
<b>COMMENTS</b>	Terminal connect time: \$9.00/hr. at 300 bps; \$18.00/hr. at 1200 bps; discounts avail. for unsupported time; all time is heavily supported, with documentation provided	Conversational financial analyses, corporate modeling, & reporting; financial planning & forecasting capabilities with sensitivity analyses; Coopers & Lybrand Oil and Gas Energy Services; asset/liability management; merger/acquisition analyses; business & market research; survey analyses	TOTAL/APL File System facilitates processing of large stored data bases; packages incl. INSIGHT (financial analysis), SHELL (DBMS), & XIBIT (graphics), QED (financial planning), & COMPASS (analysis of compustat) Also offered is Fixed Price Timesharing, a total configuration for a minimum of \$20,000/month dedicated to specific clients	Other packages include racetrack mutuals processing & customized packages; Sun Information Svcs. of Kentucky was purchased by TLG Computing in December, 1980	Contact vendor for pricing (charges shown are for DEC-10 service); connect & CPU prices vary by equipment and time of use; Tymnet data communications subsidiary provides common carrier network services to more than 250 U.S. cities and overseas access from more than 30 countries via IRCs

## All About Time-Sharing and Remote Computing Services

COMPANY	United Computing Systems, Inc.	United Computing Systems, Inc.	University Computing Company	University Computing Company
<b>GENERAL</b>				
Name of service	APEX/SL, UCS/CRAY, NOS/BE	UCS/1100	FASBAC-2	VS-370
Date operational	Jan. 1968	March 1972	1981	1977
Areas currently served	Access in 161 U.S. & 5 Canadian cities; w/31 int'l. connections; also via Tymnet & Telenet; U.K. (London data center) & Europe	Access in 161 U.S. & 5 Canadian cities w/31 int'l. connections; also via Tymnet, Telenet, U.K. (London) & FIDES (Europe)	U.S., Canada, Europe via Tymnet	Nationwide
<b>EQUIPMENT</b>				
Computers	CDC CYBER 174 and 175 (2), Cyber 730 (3), CDC 176 (2), and CRAY-1 S in Kansas City	Univac 1100/80 in Chicago	Univac 1108 (6), using Prime 750s	IBM 370/168
No. of simultaneous users	Not specified	Not specified	Not specified	Not specified
Conversational terminals supported	TTY at 10, 30, 120 cps; IBM 2741; Tektronix graphics terminals; Hewlett-Packard, & Megatek; all RS-232-C compat. for NOS/BE Service	ASCII terminals at 10, 30 and 120 cps; IBM 2741; Tektronix graphic terminals, H-P & Megatek	ASCII terminals at 10, 30, and 120 cps and correspondence code	IBM 3270
Batch terminals supported	IBM 2780/3780, HASP, CDC 22 UT; CDC 200	IBM 2780/3780, HASP, CDC 22 UT	IBM 2780, HASP, COPE, E1004	IBM 2780/3780, HASP
<b>SOFTWARE</b>				
Conversational programming languages	FORTRAN, BASIC, APL, PASCAL, INFORM, IFM, Editor, COBOL, LISP, SUPERFOR, SUPERBAS	APL, COBOL, BASIC, FORTRAN	EDIT	—
Batch-mode programming languages	FORTRAN, COBOL, BASIC, PASCAL, COMPASS, SNOBOL, SIMSCRIPT, LISP	COBOL, FORTRAN, PL/1, RPG	FORTRAN, COBOL, Assembler	FORTRAN, COBOL, PL/1, Assembler
Principal applications	Engineering, business, scientific, data base, linear programming, financial modeling	Engineering, scientific	Scientific, engineering, manufacturing, commercial	Accounting, graphics, statistical, data mgt., engineering mgt.
<b>CHARGES</b>				
Min. monthly charge:				
Interactive	\$300	\$300	Contact vendor for pricing	Contact vendor for pricing
Remote batch	\$300	\$300		
Terminal connect time:				
Interactive	\$9.50-25.00/hr.	\$14.00-20.00/hr.	—	—
Remote batch	\$10.00-75.00/hr.	\$18.00/hr.	—	—
Central processor time:				
Interactive	\$0.22-0.38/SU*	\$0.35-0.45/SU*	—	—
Remote batch	\$0.21-1.52	\$0.15-0.30/SU*	—	—
Mass storage:				
Interactive	\$0.36/1K chars./mo. \$55/205K chars./mo.	\$0.028/track (1792 words)/day	—	—
Remote batch	\$0.39/1K chars./mo. \$55/205K chars./mo.	\$0.028/track (1792 words)/day	—	—
<b>COMMENTS</b>				
	APEX/SL provides access to CRAY-1S, IBM 4341, CDC 3300 (2), CDC 3600 (4) in Boston & Univac 1180/1; UCS/CRAY service offers 1 million words real memory  *SU—System Unit	Batch and interactive control language is interchangeable  *SU (System Unit) proprietary information	Service is UCC-designed with modified EXEC; unique language modifications, file handlers, and tape protection devices; photocomposition service; many exclusive applications; FASBAC-2 gives DDP capabilities via Primenet	System charge is dependent on resource units utilized; O/S is MVS-JES II; RJE is via ROSCOE; interactive is via ROSCOE and TSO

### All About Time-Sharing and Remote Computing Services

COMPANY	University Computing Company	University Computing Company	USS Engineers and Consultants, Inc.	Wang Data Center
<b>GENERAL</b>				
Name of service	1100/OS	NOS/BE	UEC	—
Date operational	1976	1975	May 1970	1965
Areas currently served	U.S., Canada	U.S., Canada	U.S., Canada	Northeastern U.S.
<b>EQUIPMENT</b>				
Computers	Univac 1108, 1100/81	CDC CYBER 176, CYBER 175	CYBER 175, Honeywell 6080 in Pittsburgh, PA	IBM 3033, WANG V5
No. of simultaneous users	Not specified	Not specified	Not specified	Not specified
Conversational terminals supported	ASCII at 300, 1200 bps	Asynchronous to 9600 bps	Most 30 to 120 cps terminals	All IBM compatible
Batch terminals supported	IBM 2780, HASP, COPE, E1004	IBM 2780/3780, HASP, COPE	CDC 1700, CDC 200, IBM 1130, IBM 2780/3780, IBM HASP, Inco term	All IBM
<b>SOFTWARE</b>				
Conversational programming languages	FORTRAN, COBOL, BASIC, APL	FORTRAN, COBOL	FORTRAN, COBOL, BASIC, APL	COBOL, PL/1
Batch-mode programming languages	FORTRAN, COBOL, APL, Assembler	FORTRAN, COBOL	FORTRAN, COBOL	FORTRAN, COBOL, BASIC, RPG, PL/1
Principal applications	Financial modeling, structural analysis, data base, project mgmnt, others	Engineering, nuclear, scientific, graphics	Engineering, distribution	Business & scientific
<b>CHARGES</b>				
Min. monthly charge:				
Interactive	Contact vendor for pricing	Contact vendor for pricing	\$9.00/hr. Contact vendor	Contact vendor for pricing
Remote batch				
Terminal connect time:				
Interactive	—	—	None	—
Remote batch	—	—	None	—
Central processor time:				
Interactive	—	—	\$24.00/min. Contact vendor	Resource and priority based
Remote batch	—	—		
Mass storage:				
Interactive	—	—	\$1.00/10,000 chars./month Contact vendor	Priority based
Remote batch	—	—		Priority based
<b>COMMENTS</b>				
	Multiprogramming system; supports CTS conversational timesharing for text editing and interactive execution	Nuclear fuel management package available	Subsidiary of U.S. Steel Corp., lower rates for batch mode and volume usage; surcharges for certain software	Batch, interact, and TSO specialty

## All About Time-Sharing and Remote Computing Services

COMPANY	Warner Computer Systems, Inc.	Western New York Computing Systems, Inc.	Xerox Computer Services	Xerox Computer Services
<b>GENERAL</b>				
Name of service	—	—	Interactive Accounting System (IAS)	General Timesharing Service
Date operational	1971	Oct. 1971	1970	1978
Areas currently served	U.S. Canada, Europe, Mexico	Western New York State	Continental U.S. & Europe	Continental U.S. & Europe
<b>EQUIPMENT</b>				
Computers	Xerox Sigma 6's, Sigma 9, DEC 20	Data General Nova 840, Nova 2/10, Nova 3/12 (4)	IBM 3033N's, Amdahl 470-V8, and Xerox Sigma 7's & 9's; a total of 23 mainframes located in 3 data centers in the greater Los Angeles area	Xerox Sigma 9, IBM 4341 in Hawthorne, CA
No. of simultaneous users	128 per system on Sigmas, 32 on DEC	62 at 300 or 1200 bps	4500+	84 total (24 at 120 cps; 60 at 30 cps)
Conversational terminals supported	Most 10 to 120 cps terminals	Any ASCII terminal	Xerox 1340/1340A/1330/1350; any std. ASCII async. terminal	Any standard ASCII asynchronous terminal
Batch terminals supported	IBM 2780/3780, HASP and compatible units	—	Xerox 1350	Any IRBT (intelligent remote batch terminal) utilizing HASP protocol
<b>SOFTWARE</b>				
Conversational programming languages	FORTRAN, COBOL, BASIC, APL	BASIC, FORTRAN	Proprietary "Plain English" language activates standard Xerox programs	APL, BASIC, COBOL, FORTRAN
Batch-mode programming languages	FORTRAN, COBOL, BASIC, APL	BASIC	—	APL, BASIC, COBOL, FORTRAN
Principal applications	Financial, brokerage systems, insurance systems	Credit union service, medical billing systems, custom time-sharing, town court systems, membership organization, financial planning	Act'g., mfg., distribution utility billing, municipal, general time-sharing	Software system called CONTROL for financial management, analysis & modeling; also custom designed applications
<b>CHARGES</b>				
Min. monthly charge:				
Interactive	\$20.00	None	\$1,400	\$500
Remote batch	\$20.00	—	—	\$500
Terminal connect time:				
Interactive	\$11.00-13.00/hr.	\$5.00-9.00/hr.	See Comments	\$10.00/hr.
Remote batch	—	—	—	\$10.00/hr.
Central processor time:				
Interactive	\$0.19/CPU*	\$0.01/second	See Comments	\$15.00/CPU
Remote batch	\$0.13-0.15/CPU*	—	—	\$15.00/CPU
Mass storage:				
Interactive	\$0.27-0.50/1K chars./month	\$0.10/1000 chars./mo.	See Comments	\$0.012/2048 bytes/day
Remote batch	\$0.27-0.50/1K chars./month	—	—	\$0.012/2048 bytes/day
<b>COMMENTS</b>				
	Full service company offering financially-oriented systems (financial modelling, cash mgt., etc.) to Fortune 1000 companies; maintains large data bases for the investment community; offers a fully automated assigned risk Automobile Insurance System	Concentrates on custom local support and dedicated long term relationships with clients; complete consulting services for all data processing needs	Offers integrated on-line accounting system; charges are based upon transactions entered, storage used, and lines printed; over 20 applications for manufacturers, distributors, local government and utilities	If the solution to your problem requires the development of a unique system, Xerox Computer Services technical consultants will define the problem, design the system, develop the programs, write the documentation, and train and support your staff for as long as the system is used, with guaranteed results
	*CPV unit equates to a CPU second; 60 CPV's equal one CPU minute			