COMMERCIAL TIME-SHARING SYSTEMS

Users can purchase remote, on-line and interactive computer services from the organizations listed below.

ORGANIZATION	COMPUTER	CONVERSATIONAL LANGUAGES	TERMINALS	NO. OF* USERS	FIXED FEE/ MO. PER TERMINAL	AVG. COST PER TERMINAL HR. †	ADDITIONAL COST PER CPU TIME HR. FOR	BACK-GROUND
Allen-Babcock Computing, Inc. Los Angeles, California	IBM 360/50[1]	PL/I (on-line engineering subset)	IBM 2741	60	$225[2]	None	$240-$480[3]	Yes
Applied Logic Corp. Tele-Computing Center Princeton, New Jersey	DEC PDP-6	FORTRAN IV MACRO-6	TT-33 CRT	20	None	$5.00	Yes	Yes
Bolt, Beranek and Newman Inc. TELCOMP Service Cambridge, Mass.	DEC PDP-1	TELCOMP	TT-33	16	None	$12.50	$360	Yes
CEIR Inc. Arlington, Virginia	GE-235 DATANET-30	BASIC	TT-33	30	None	$5.00	None	No
COM-SHARE Inc. Ann Arbor, Michigan	SDS 940	FORTRAN, CAL ALGOL, BASIC LISP, QED, HELP MACRO	TT-33,35	32	None	$10.00	None	Yes
General Electric Co.[4] New York, N.Y.	GE-235 DATANET-30	BASIC ALGOL	TT-33,35 DN-750 DN-760	40	$350[5]	$10.00	$180	No
General Electric Co. Missile and Space Division Valley Forge, Pa.	GE-235 DATANET-30	FORTRAN MOPSYS COGO	TT-33,35		None	$20-$30	None	No
KEYDATA Corp. (Charles W. Adams Assoc.) Cambridge, Mass.	UNIVAC 491	KOP-III	TT-28	200	[6]	[6]	[6]	Yes
Munitype Inc.[7] New York, N.Y.	GE-225 DATANET-30	SCTS	TT-28, 33 TT-35	50	$150-$350	None	None	No
International Business Machines[8] QUIKTRAN Service New York, N.Y.	IBM 7044	QUIKTRAN	IBM 1050	40	None	$12.00	None	No
Tymshare Assoc. Palo Alto, California	SDS 940	FORTRAN, CAL ALGOL, BASIC LISP, QED, HELP MACRO, SNOBOL	TT-33, 35	60	None	$13.00	None	Yes

* In all cases the number of users can be increased by addition of equipment or by duplicating the computer system.

† Calculated on the basis of 50 hours usage per month.

NOTES
1. Special operation codes for efficient conversational interaction added.
2. Includes cost of terminal.
3. Dependent on amount of core used.
4. Additional systems located in Phoenix, Washington, D.C., and Schenectady.
5. Includes 25 hours of terminal time and 2 hours of CPU time.
6. For accounting and management uses. Charges on basis of message transmissions, processor time and storage used.
7. For Bond Pricing and related business operations.
8. Additional system located in Los Angeles.

COMPUTER RESEARCH CORPORATION

TIME-SHARING SYSTEM SCORECARD

A SURVEY OF ON-LINE MULTIPLE USER COMPUTER SYSTEMS

Spring, 1966   No. 3

This guide is prepared periodically to keep the reader abreast of the rapidly increasing number of time-shared computer systems which are bringing man and machine together in close partnership for the pursuit of intellectual and administrative activities. By glancing at the following charts the reader can judge for himself the progress which is being made in this new and dynamic field. There are several different definitions of time-sharing. No single definition is adequate for all purposes. We have limited this survey to systems which have at least two independent, remote and simultaneously operable consoles (from the user's point of view). If the language capabilities of the system are extensive and general so that a user can create new languages while working on-line, we have denoted this as a general purpose time-sharing system. Where the language capabilities are more restrictive, permitting the user to work in only one specific problem area, we have used the term special purpose time-sharing system.

Perhaps the most significant change in the past six months is the increasing number of commercial time-sharing services which are being offered by small independent companies operating on a regional basis throughout the country. Meanwhile, the corporate giants seem to be moving more slowly in the face of numerous legal uncertainties concerning the establishment of nation-wide information services using common-carrier communication facilities. However, several large corporations have recently entered the on-line information industry with medical and educational services. For example, GE has just formed a MEDINET (medical information network) division to sell time-shared information services to hospitals.

Except for SDS's unveiling of its super time-sharing machine, the SIGMA 7; few announcements of new machines have been made by the manufacturers despite rumors that Honeywell and RCA are about to make their time-sharing plans known. Five IBM System 360, model 67's are being installed for time-sharing service at MIT, System Development Corp., Lincoln Laboratory, the Carnegie Institute of Technology, and the University of Michigan.

Time-sharing goes international with the announcement of systems in France and Australia. SACS, a Parisian management consulting group, has time-shared a Bull-GE M40 with four terminals and offers a Fortran IV compiler. In Canberra, the government research organization, CSIRO, is time-sharing a CDC 3600 with seven users and will provide Fortran, Cobol and Algol.

CHARACTERISTICS LISTED IN CHARTS

STATUS	O-operational system, number in parentheses denotes the approximate date that the system went on the air. D-system under development with anticipated date that operations will begin.
TYPE	G-general purpose, S-special purpose.
COMPUTER	manufacturer's name and number of central computers in system.
LANGUAGES	basic languages available on system at present.
TERMINALS	type of terminal equipment available, number of such terminals in parentheses. Code: TT followed by number denotes TELETYPE terminals and model number, TY-typewriter, TLX-Telex console, CRT-cathode ray tube display, BR-Bunker Ramo series 200 display consoles, IBM 1050-keyboard consoles, PHILCO-display consoles.
MAIN STORAGE	first number denotes total core storage in words on system, second number in parentheses, if given, denotes maximum core storage available to an individual user.
SECONDARY STORAGE	DR-magnetic drum, DK-disk file, MT-magnetic tape (K = 1024, M = 1,000,000).
NO. OF USERS	maximum number of users who can operate simultaneously at any given time.

RESEARCH ORIENTED TIME-SHARING SYSTEMS

ORGANIZATION	STATUS	TYPE	COMPUTER(S)	LANGUAGE(S)	TERMINALS	MAIN STORAGE	SECONDARY STORAGE	NO. OF USERS	REMARKS
Bell Telephone Laboratories [1] Murray Hill, New Jersey	D (12/66)	G	GE-645 [2]	FORTRAN IV COBOL, PL/I SNOBOL	TT-37 IBM 1050 CRT (10)	256K	DK (40M Wds.) DR (4M Wds.) Tape Loop (100M Wds.)	100	Highly interactive system for research and production computing
Bolt, Beranek and Newman Inc. [3] Cambridge, Mass.	O (6/64)	G	PDP-1D [4]	MIDAS TELCOMP [5]	TT-33 (90)	24K (4K)	DR (128K Wds.) DR (25M Wds.) MT (2 Units)	64	Medical information and communications system for hospitals
Carnegie Institute of Technology Pittsburgh, Penn.	O (7/64)	G	G-21	ALGOL, IPL-V FORTRAN	TT-33 (22) TT-35 (22)	72K	DK (1M Wds.) DK (22M Wds.)	16	Will install an IBM 360 Model 67 in early 1967
Dartmouth College [6] Hanover, N. H.	O (5/64)	G	GE 235 DATANET-30	BASIC ALGOL	TT-35 (37)	32K (6K)	DK (6M Wds.) MT (8 Units)	27	Educational time-sharing system
Lincoln Laboratory — MIT Lexington, Mass.	O (2/66)	G	TX-2	CORAL, VITAL MARK 5	TY (5), CRT (4) RAND TABLET	105K	DR (20M Wds.)	5	System features fast response time for on-line graphical communication
Lincoln Laboratory — MIT Lexington, Mass.	D (1/67)	G	IBM 360 [2] Model 67	MACRO FORTRAN IV PL/I, COBOL	IBM 2741 (50) IBM 2260-3 (30) IBM 2250-2 (8)	192K	DR (1M Wds.) DK (14.5M Wds.) MT (16 Units)		Establishment of a large computational facility for scientific and engineering research. First IBM 360 Model 67 to be installed
MIT Computation Center Cambridge, Mass.	O (11/61)	G	IBM-7094	Same as Project MAC Phase one		64K (32K)	DK DR MT	24	
MIT Computation Center Cambridge, Mass.	D (1/67)	G	IBM 360 [2] Model 67			256K	DK (52M Wds.)	200	
MIT Dept. of Civil Eng. ICES SYSTEM Cambridge, Mass.	D (12/66)	S	IBM 360 Model 40	ICETRAN STRESS COGO	IBM 2741 (5) IBM 2250	32K	3 DK (1.8M Wds.)		Integrated system for civil engineering problems
MIT Dept. of Electrical Eng. Cambridge, Mass.	O (5/63)	G	PDP-1	Macro Assembler	TY (4)	12K	DR (88K Wds.)	4	Experimental time-sharing system for student use in thesis and research projects
Ohio State University Columbus, Ohio	D (9/66)	G	GE-645 [2]		TT (15) CRT (8)	64K	DK	23	
Perkin Elmer Corp. Norwalk, Conn.	D (6/66)	G	SDS-9300 SDS-930	FORTRAN IV ALGOL	TT, TY TWX	32K (24K)	DK (2M Wds.) MT (4 Units)	16	For R&D applications, under development with Computer Assoc. and Digitek
Project MAC — MIT (Phase One) Cambridge, Mass.	O (10/63) [7]	G	IBM-7094	ALGOL [8] FORTRAN MAD LISP	TT-35 (54) IBM-1050 (56) TLX (1) TWX PRIME (3) CRT (2)	64K (32K)	DK (36M Wds.) DR (.5M Wds.) MT (12 Units)	30	Project MAC is an MIT research program sponsored by the Advanced Research Projects Agency, D.O.D., under a contract with the Office of Naval Research
Project MAC — MIT (Phase Two) Cambridge, Mass.	D (9/66)	G	GE-645 [2]		TT-37 [9]	128K	DK DR (4M Wds.) MT (8 Units)	150	Expected to be capable of limited demonstration in Fall, 1966 and in normal operation by January 1967
RAND Corporation Santa Monica, California	O (11/65)	G	PDP-6 [10]	JOSS II	TY (30) [12] TT-35	32K	DK (6M Wds.) DR (1M Wds.)	30	Interpretive system with compact conversational language for small numerical problems
Rensselaer Polytechnic Institute Troy, N. Y.	D (8/66)	G	IBM 360 Model 50	FORTRAN	TT-33 (16)	64K	3DK (1.8M Wds.) MT (4 Units) Core (256K Wds.)	16	For education, language development and control of laboratory experiments
TRW Systems Group Redondo Beach, California	O (1/65)	S	Bunker- Ramo 340	Culler-Fried System for Mathematical Analysis	4 Consoles [11]	16K	DR (48K Wds.) MT	4	Highly flexible system for on-line manipulation, specification and execution of mathematical and symbolic operations with graphical display of results
Stanford University Stanford, California	O (8/64)	G	IBM-7090 PDP-1	MACRO LISP, BALGOL FORTRAN	PHILCO (12) TT-33 (8)	32K	DK DR (128K Wds.)	20	PDP-1 has 20 users with a maximum of 4 having access to an IBM 7090
System Development Corp. Santa Monica, California	O (1/64)	G	AN/FSQ-32 [13] PDP-1	TINT IPL-TS JOVIAL LISP	TT-28 (6) TT-33 (22) TY (3) CRT (6)	68K (48K) 16K Buffer	3 DR (136K Wds.) DK (4M Wds.) MT (16 Units)	30	Oriented to command and control experimentation and other general uses
U.C.L.A. Western Data Processing Center Los Angeles, California	O (11/64)	S	IBM-7740 [14] IBM-7040/ 7094		IBM-1050 (12)	32K	DK DR	12	Jointly financed by UCLA and IBM, system services UCLA and 88 other California schools
University of California Berkeley, California	O (4/65)	G	SDS-930 PDP-5	FORTRAN ALGOL, LISP SNOBOL, CAL	TT-33, 35 (16) CRT, RAND TABLET	32K (16K)	DR (1.3M Wds.)	16	
University of California Santa Barbara, California	O (3/65)	S	RW 400 AN/FSQ-27	Culler-Fried System for Mathematical Analysis	16 Consoles [11] RAND TABLET	6K	DR (80K Wds.) DR (500K Wds.)	16	Highly flexible system for on-line manipulation, specification and execution of mathematical and symbolic operations with graphical display of results
University of Pennsylvania Philadelphia, Penn.	D (6/65)	G	IBM-7040 PDP-5	MULTI-LANG MAP, ALGOL	TT-35 (4) BR (2)	32K (24K)	DK	6	
U.S. Military Academy West Point, N.Y.	O (12/65)	G	3 GE-225 Datanet-30	FORTRAN II	TT-35 (15)	54K (18K)	DK (18M Wds.)	15	Educational time-sharing system

NOTES

1. Development in cooperation with Project MAC, Massachusetts Institute of Technology.
2. Multiple processor time-sharing system.
3. Developed with the Massachusetts General Hospital under contract from the National Institutes of Health.
4. Based upon an earlier 5-station PDP-1 system operational 9/62.
5. Version of the RAND JOSS language.
6. Developed with the cooperation of the General Electric Co.
7. Initially time-shared in 1961 at the M.I.T. Computation Center.
8. Other languages include FAP, SLIP, COGO, SNOBOL, STRESS, GPSS, COMIT, OPL-1 and OPS-3.
9. In addition will use same terminals as MAC Phase One.
10. Replaces the Johnniac JOSS system, operational in 5/63.
11. Each console consists of two keyboards and a storage tube display. A camera and plotter are shared among the consoles.
12. Selectric with JOSS keyboard and paging.
13. To be replaced by an IBM 360 Model 67 in early 1967.
14. System currently utilizes five computers in addition to central 7740.