COMPUTER RESEARCH CORPORATION

TIME-SHARING SYSTEM SCORECARD

A SURVEY OF ON-LINE MULTIPLE USER COMPUTER SYSTEMS

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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.

The number of commercial and research time-sharing systems has grown so rapidly in the past several months that it is no longer possible to list each individual system in a brochure of this size. Therefore, we have listed only the first or major occurrences of any time-sharing system which operates on a particular type of computer. Readers desiring more complete and frequent information about the field of on-line or time-shared computer systems are invited to subscribe to our newsletter "The On-Line Newsline," which will be published every other month starting with the January issue. The annual subscription fee is $6. The first issue will include a list of all multiple user computer systems known to be in existence anywhere in the world.

Perhaps the greatest time-sharing activity in the past several months has been in the commercial systems area. A coast to coast network of SDS 940 time-sharing systems is just coming into operation. Meanwhile G.E. is increasing the number of its computer centers around the country. The competitive pressure has been strong however; one service has closed its doors while another is facing serious problems.

Two time-sharing systems seem to be gaining wide acceptance in research organizations across the country. IBM 360/67 systems are being installed for time-sharing service at MIT, System Development Corp., Lincoln Laboratory, the Carnegie Institute of Technology, and the University of Michigan. SDS 940 systems are on order at Stanford Research Institute, BBN, SDC, Harvard and Computer Research Corporation. A G.E. 645 has been delivered to the Rome Air Development Center.

Time-shared systems for education are beginning to emerge with systems such as the IBM 1500 and the RCA educational system which may be built on a Spectra 70/45. A discussion of these and other educational systems such as the Plato Project at the University of Illinois will appear in an early issue of our On-Line Newsline.

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, 2741-keyboard consoles, IBM 2250, 2260, 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, CORE-bulk core, CF-random access card file (K = 1024, M = 1,000,000 wds. per unit).

NO. OF USERS maximum number of users who can operate simultaneously at any given time.

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	MINIMUM CHARGE PER MONTH	AVG. CHARGE PER TERMINAL HR. †	CHARGE PER MIN. OF CPU TIME	DISC § STORAGE/ CUSTOMER
Allen-Babcock Computing, Inc. **Palo Alto, California**	IBM 360/50[1]	PL I (on-line subset)	IBM 2741 TT, TLX	60	$575 [2]	None	$4-$8 [3]	100K+
Applied Logic Corp.[4] **Princeton, New Jersey**	DEC PDP-6	FORTRAN IV MACRO-6	TT-33, 35 CRT	20	None	$5.00	$6.00	None
Bolt Beranek and Newman Inc. **Cambridge, Mass.**	DEC PDP-1	TELCOMP	TT-33	32	None	$12.50	None	None
CEIR Inc. **Arlington, Virginia**	GE-235 DATANET-30	BASIC	TT-33, 35	40	$250	$5.00	None	120K
COM-SHARE Inc. **Ann Arbor, Michigan**	SDS 940	FORTRAN, CAL [5] ALGOL, BASIC,	TT-33, 35	32	$40 [6]	$15.50	$2.50	60K+
DIAL-DATA, Inc.[4] **Newton, Mass.**	SDS 940	FORTRAN, CAL [5] ALGOL, BASIC	TT-33, 35	32	$100	$13.50	$3.00	60K+
General Electric Co.[7] **Information Service Dept.** **Bethesda, Md.**	GE-235 DATANET-30	BASIC ALGOL FORTRAN	TT-33, 35	40	$350	$10.00	$3.00	60K+
General Electric Co. **Valley Forge, Pa.**	GE-235 DATANET-30	FORTRAN MOPSYS, COGO	TT-33, 35	18	$300	$20-$30	None	192K
International Business Machines **New York City, Los Angeles**	IBM 7044	QUIKTRAN	IBM 1050	50	$325	$12.00	None	410K
KEYDATA Corp. (Adams Assoc.) **Cambridge, Mass.**	UNIVAC 491	KOP-III	TT-28	200	8	8	8	
Renown Properties, Inc. *Minneapolis, Minn.*	GE-225 DATANET-30	ALGOL, BASIC FORTRAN	TT-33, 35	40	$350	$10.00	$3.00	0+
TYMSHARE Inc. **Los Altos, California**	SDS 940	FORTRAN, CAL [5] ALGOL, BASIC	TT-33, 35	60	$100 or $390	$13.00	None	60K+
VIP Systems Corp. **Washington, D.C.**	IBM 1440	IBM Administrative Terminal System	IBM 2741	40	$375	$7.50	None	100K+

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

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

§ Number denotes amount allocated in characters or bytes, + indicates more available at extra charge.

NOTES

1. Special operation codes for efficient conversational interaction added.
2. Plus $195/mo. for terminal and communication.
3. Dependent on amount of core used.
4. Also using system for time-sharing research projects.
5. Other languages include LISP, SNOBOL, ARPAS, DDT, QED and HELP.
6. Charge varies from $40 for 1 hr. to $2,200 for unlimited use.
7. Systems located in New York City, Schenectady, Chicago, Phoenix, Los Angeles, Detroit, Cleveland and Washington, D.C.
8. For accounting and management uses. Charges on basis of message transmissions, processor time and storage used.

A WORD ABOUT COMPUTER RESEARCH CORPORATION

Computer Research Corporation provides consulting, research, engineering and programming services leading to the effective use of computers as problem solving tools. As specialists in the man-machine partnership, we strive to make men more productive as they pursue intellectual and administrative activities.

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RESEARCH ORIENTED TIME-SHARING SYSTEMS

Prepared by COMPUTER RESEARCH CORPORATION

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 (6/67)	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 (32K)	DK (12M Wds.) CF (175M Wds.)	16	An IBM 360/67 will be operational in 4/67, with a compiler for compilers in 9/67.
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.
Lockheed Georgia Co. Marietta, Georgia	O (7/65)	G	IBM 360 Model 50	FORTRAN IV	IBM 1050 (27)	32K (20K)	3 DK (1.8M Wds.)	30	Based on an earlier system developed on the IBM 360 Model 40.
MIT Computation Center Cambridge, Mass.	D (1/67)	G	IBM 360 [2] Model 67			256K	DK (52M Wds.)	200	Will replace a time-sharing system similar to Project MAC (Phase One).
MIT Dept. of Civil Eng. (ICES) Cambridge, Mass.	D (12/66)	S	IBM 360 Model 40	ICETRAN STRESS, COGO	IBM 2741 (5) IBM 2250	32K	3 DK (1.8M Wds.)	5	Integrated system for civil engineering problems.
MIT Dept. of Electrical Eng. Cambridge, Mass.	O (5/63)	G	PDP-1	Macro Assembler	TY (4)	12K (8K)	DR (88K Wds.)	5	Experimental time-sharing system for student use in thesis and research projects.
National Bureau of Standards Washington, D.C.	O (4/66)	G	MOBIDIC B [2]	DESCAL, CL6 CAS, EDIT	TT-33, 35 (4) CRT	16K (6K)	DK (1M Wds.) MT (4 Units)	6	Uses include research in the design of on-line systems and terminals.
Ohio State University Columbus, Ohio	D (1/68)	G	GE-645 [2]	FORTRAN IV PL/1	TT (20) CRT (8)	128K	DK, DR MT (6 Units)	28	Initial plans include extensive background batch-processing.
Perkin Elmer Corp. Norwalk, Conn.	O (10/66)	G	SDS-9300 SDS-930	FORTRAN IV ALGOL	TT, TY, TWX Storage Tube	32K (24K)	DK (2M Wds.) MT (4 Units)	16	Uses include optical design and document preparation.
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) 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 (ARPA), D.O.D., under a contract with the Office of Naval Research.
Project MAC — MIT (Phase Two) Cambridge, Mass.	D (6/67)	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 June 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.
Stanford University Stanford, California	O (8/64)	G	IBM-7090 PDP-1	MACRO LISP, BALGOL	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. Will install an IBM 360 Model 67.
TRW Systems Group Redondo Beach, California	O (1/65)	S	Bunker-Ramo 340	Culler-Fried System for Mathematical Analysis	4 Consoles [11] RAND TABLET	16K	DR (48K Wds.) MT (2 Units)	4	Highly flexible system for on-line manipulation, specification and execution of mathematical and symbolic operations with graphical display of results.
U.C.L.A. Western Data Processing Center Los Angeles, California	O (11/64)	G	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 Project GENIE Berkeley, California	O (4/65)	G	SDS-930 PDP-5	FORTRAN ALGOL, LISP SNOBOL, CAL	TT-33, 35 (16) CRT (2) RAND TABLET	32K (28K)	DR (1.3M Wds.) MT (2 Units)	16	Features hardware address mapping. The SDS 940 system is based on the results of this ARPA sponsored project.
University of California Irvine, California	O (1/66)	G	IBM 1410 IBM 1440	JOSSI [5] Coursewriter	IBM 1050(18)	100K Characters	DK MT (5 Units)		Uses include computer-assisted instruction and the administration of student enrollment.
University of California Santa Barbara, California	D (1/67)	G	IBM 360 Model 50	Culler-Fried System FORTRAN IV	20 Consoles [11] RAND TABLET IBM 1050 (3)	64K	4 DK (1.8M Wds.) DR (1M Wds.) Core (.5M Wds.)	16	Extension of the Culler-Fried system now operating on the RW400. The 360/50 system has simultaneous background processing.
University of Illinois Urbana, Illinois	O (1/66)	G	ILLIAC II PDP-7	FORTRAN	TT-33, 35 (8) CRT	8K (6K)	DK (10M Wds.) DR (64K Wds.)	7	Experimental time-sharing system for general university research.
University of Massachusetts Amherst, Mass.	D (3/67)	G	CDC 3600 PDP-8	FORTRAN IV COGO	TT-33 (64)	32K (8K)	2 DK (1M Wds.) 2 DR (.5M Wds.)	64	To provide a remote computer facility for use by students and faculty.
University of Pennsylvania Philadelphia, Penn.	O (6/65)	G	IBM-7040 PDP-8	MULTI-LANG MAP, FORTRAN	TT-35 (4) BR (2)	32K (24K)	DK MT (6 Units)	6	Uses include information retrieval research and multiprogramming experimentation.
University of Pittsburgh Pittsburgh, Penn.	O (3/66)	G	IBM 360 Model 50	PIL [5]	IBM 1050 (3) IBM 2741 (7)	32K (8K)	2 DK (1.8M Wds.) MT (2 Units)	20	QUIKTRAN and the PITT Natural Language Processor will be available in 1/67.

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. Based on 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.
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.