Adventures
in the
Math Sciences Building

- Intro – the importance of the building to the CS program
- The Move to the Building
- The Computer Center
- Dealing with the Bureaucracy
- The Classes

[54] METHOD FOR PROGRAMMABLY CONTROLLING THE SEQUENCE OF EXECUTION OF DATA BLOCKS IN A PROGRAM

[75] Inventors: **John A. Berenberg; David M. Clabaugh,** both of Cincinnati; **Ralph C. Taylor, Jr.,** West Chester, all of Ohio

[73] Assignee: **Cincinnati Milacron Inc.,** Cincinnati, Ohio

3,306,442	2/1967	Devol	209/121

Primary Examiner—J. V. Truhe
Assistant Examiner—Eugene S. Indyk
Attorney, Agent, or Firm—C. Richard Eby

[57] ABSTRACT

A method is disclosed for detecting the presence of a workpiece characteristic and controlling the sequence of execution of operational steps in a machining program. First instructions in a machining program cause a

The Math Sciences Building

Courtesy Purdue University Libraries, Archives and Special Collections

Math Sciences was …

- Our first real home
- The site of many interesting events during the formative years

Courtesy Purdue University Libraries, Archives and Special Collections

Move to the New Building

Courtesy Purdue University Libraries, Archives and Special Collections

September 1966

- The grad students who enrolled then were the last ones to start at the Engineering Administration building (ENAD).
- This month also saw the appointment of John Steele as Associate Director of the Computer Sciences Center, responsible for its entire operation.

September 1966

- Computers included an IBM 7094 and an IBM System/360 Mod. 40.
- The CSC announced it would now operate 24/7.
- Compilers were available for Fortran, Algol, Cobol, SNOBOL, MAD, Lisp, Slip, and a compiler-compiler called TMG (“Transmogrify”).

September 1966

- The Purdue fast Fortran translator (PUFFT) running under the Purdue time-sharing system (PTSS) could compile ☞50☜ Fortran IV statements per second.
- But PUFFT programs could occupy at most 15,000 words of main memory.

March 1967

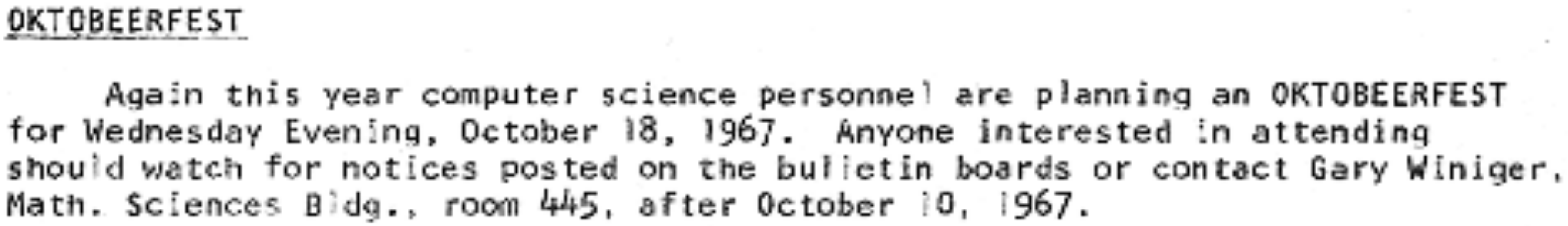
- We support a new language, PL/I, “which combines some of the best features of Cobol and Fortran.”
- Installation of CDC 6500 computer is scheduled for August, after the planned move. Later slipped to October.

August 1967

- Department and computer center move to new Math Sciences building.
- CS faculty & grad students with offices & desks on one floor.
- Late night socializing, food/drink expeditions.

October 1967

- Not kidding about the socializing



OKTOBEERFEST

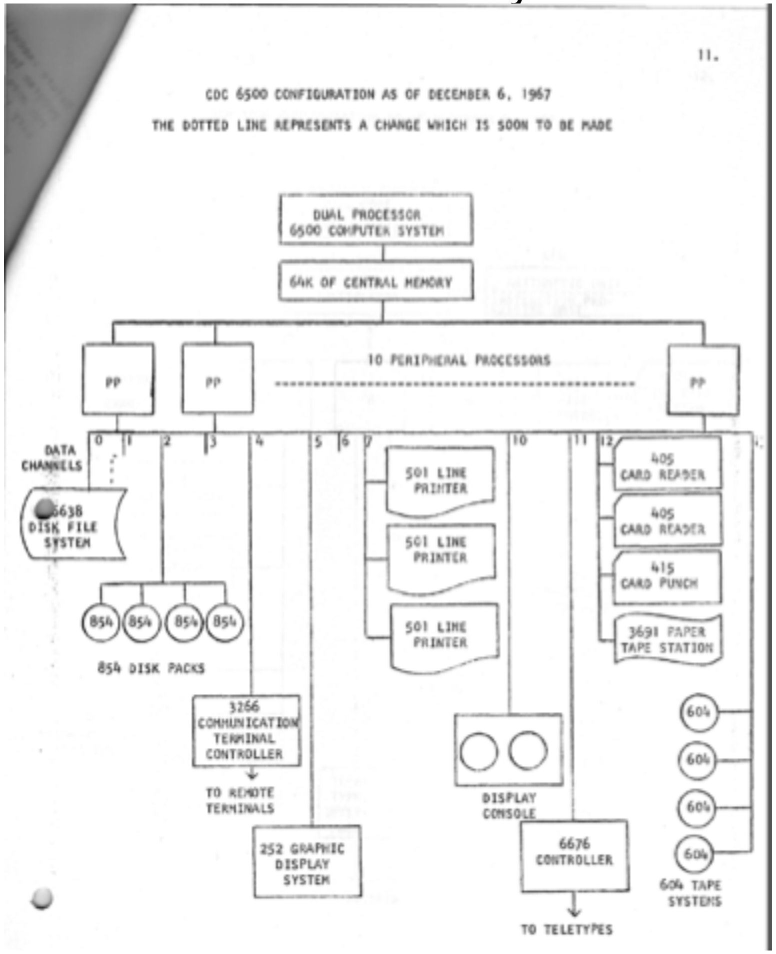
Again this year computer science personnel are planning an OKTOBEERFEST for Wednesday Evening, October 18, 1967. Anyone interested in attending should watch for notices posted on the bulletin boards or contact Gary Winiger, Math. Sciences Bldg., room 445, after October 10, 1967.

Building Features

- Grad student furniture is doll-sized and constructed of pasteboard.
- Only one copy machine for the whole building (NOT self service, and a charge code required).
- Elevators that can’t descend to the computer center during rush times, because of short timeout on the down arrows.

Computer Configurations

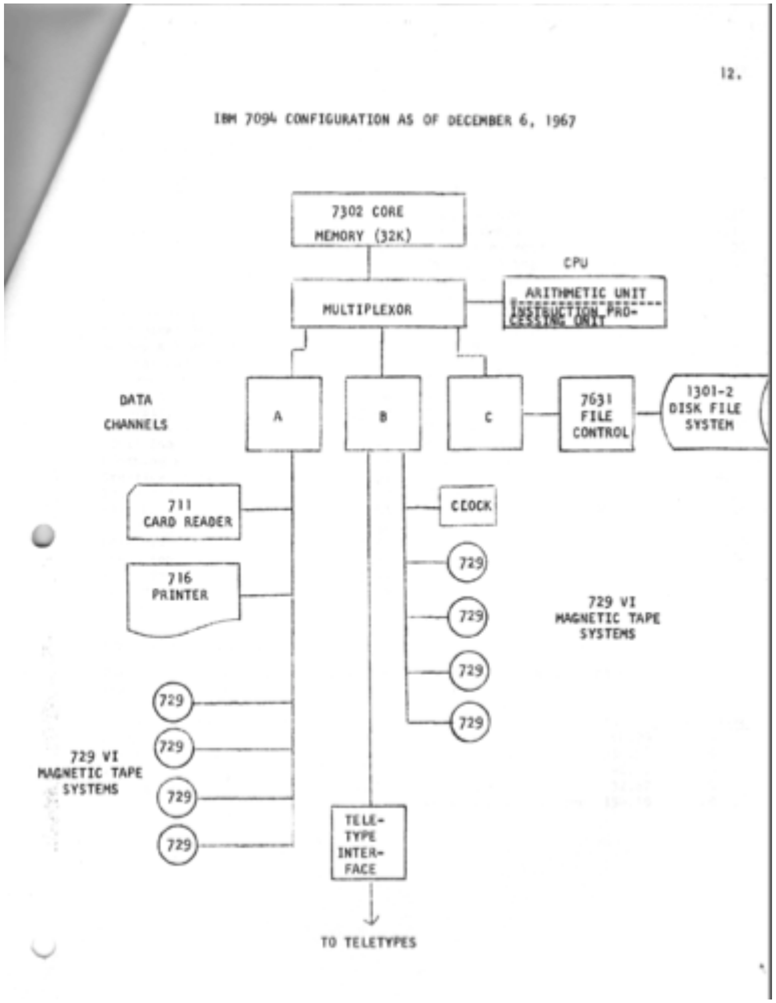
- Check out those memory sizes!



11.

CDC 6500 CONFIGURATION AS OF DECEMBER 6, 1967

THE DOTTED LINE REPRESENTS A CHANGE WHICH IS SOON TO BE MADE

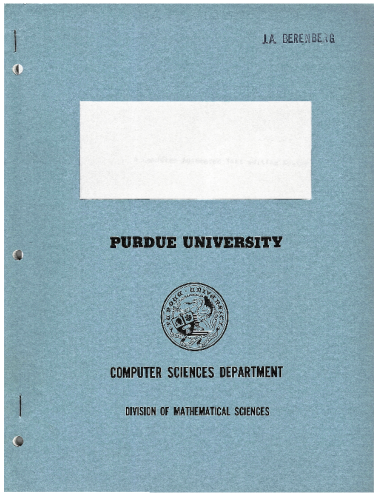


12.

IBM 7094 CONFIGURATION AS OF DECEMBER 6, 1967

September 1968

- CS Department and Compute Center were formally split.
- Prof. Saul Rosen became full-time director of the center.
- Prof. Samuel Conte remained head of the department.

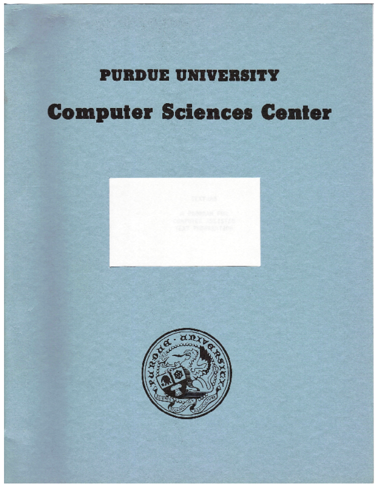


J.A. BERENBERG

PURDUE UNIVERSITY

COMPUTER SCIENCES DEPARTMENT

DIVISION OF MATHEMATICAL SCIENCES

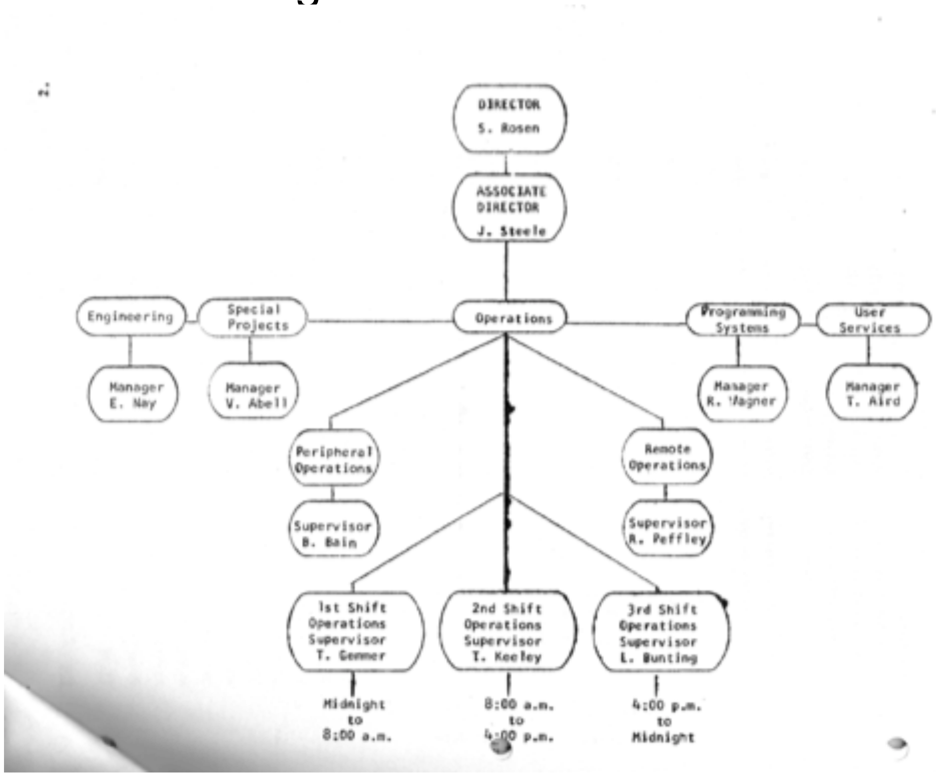


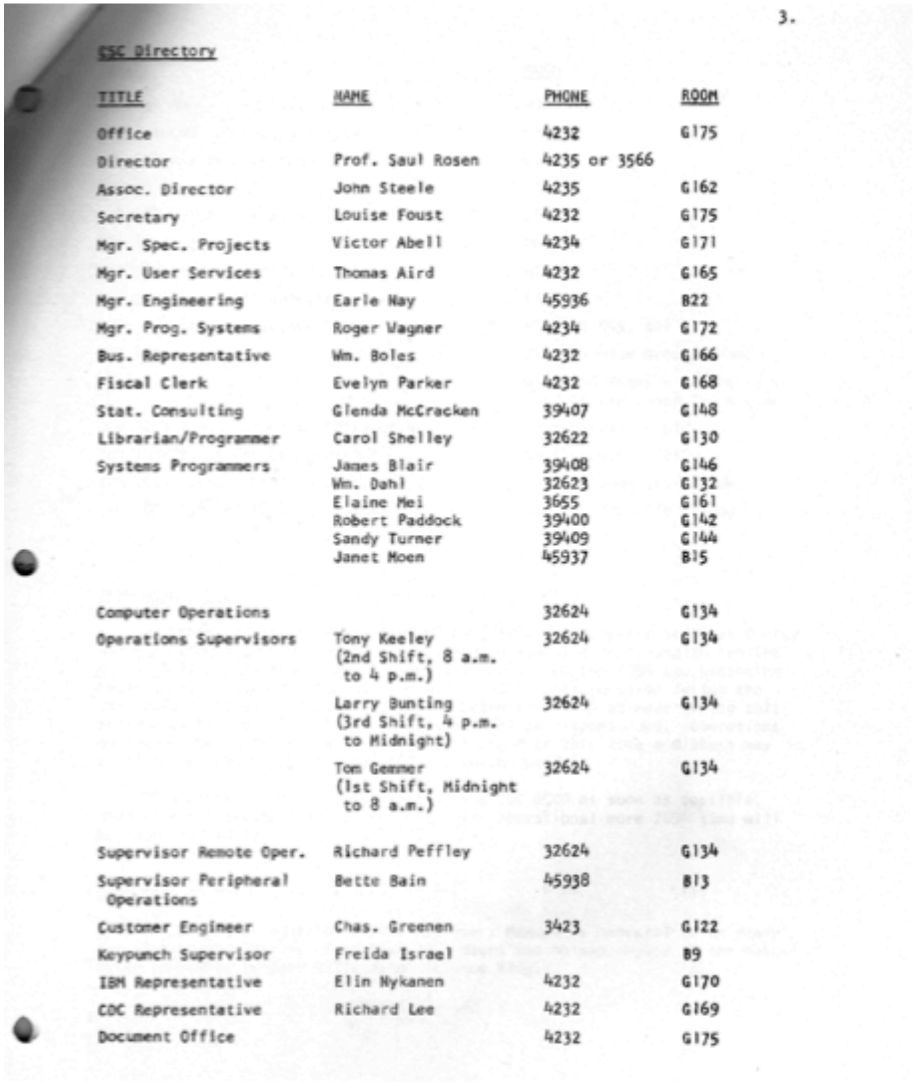
PURDUE UNIVERSITY

Computer Sciences Center

September 1968

- CSC Org Chart




3.

CSC Directory

TITLE	NAME	PHONE	ROOM
Office		4232	G175
Director	Prof. Saul Rosen	4235 or 3566	
Assoc. Director	John Steele	4235	G162
Secretary	Louise Foust	4232	G175
Mgr. Spec. Projects	Victor Abell	4234	G171
Mgr. User Services	Thomas Aird	4232	G165
Mgr. Engineering	Earle Nay	45936	B22
Mgr. Prog. Systems	Roger Wagner	4234	G172
Bus. Representative	Wm. Boles	4232	G166
Fiscal Clerk	Evelyn Parker	4232	G168
Stat. Consulting	Glenda McCracken	39407	G148
Librarian/Programmer	Carol Shelley	32622	G130
Systems Programmers	James Blair	39408	G146
	Wm. Dahl	32623	G132
	Elaine Mei	3655	G161
	Robert Paddock	39400	G142
	Sandy Turner	39409	G144
	Janet Moen	45937	B15
Computer Operations		32624	G134
Operations Supervisors	Tony Keeley (2nd Shift, 8 a.m. to 4 p.m.)	32624	G134
	Larry Bunting (3rd Shift, 4 p.m. to Midnight)	32624	G134
	Tom Gemmer (1st Shift, Midnight to 8 a.m.)	32624	G134
Supervisor Remote Oper.	Richard Peffley	32624	G134
Supervisor Peripheral Operations	Bette Bain	45938	B13
Customer Engineer	Chas. Greenen	3423	G122
Keypunch Supervisor	Freida Israel		B9
IBM Representative	Elin Nykanen	4232	G170
CDC Representative	Richard Lee	4232	G169
Document Office		4232	G175

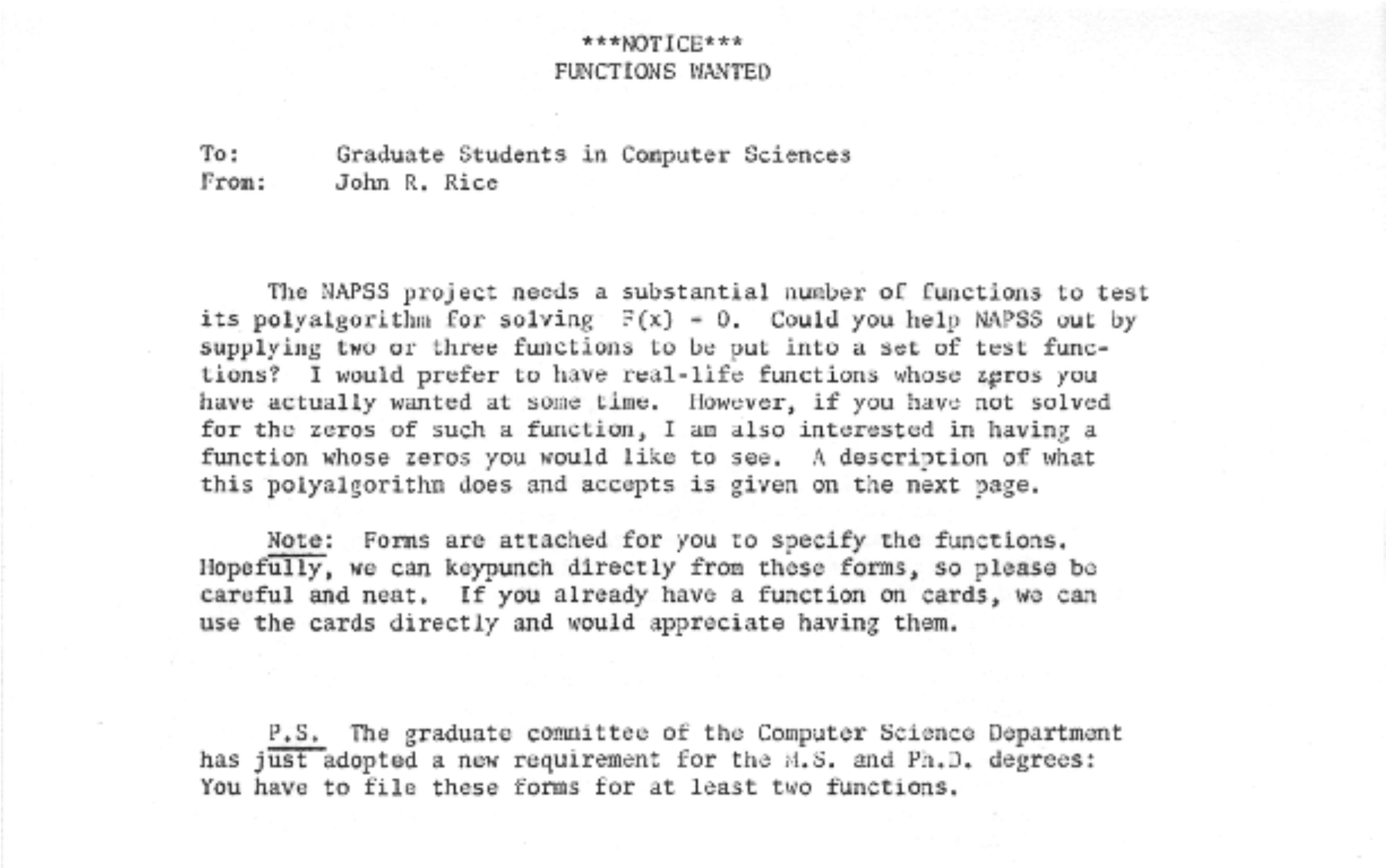
September 1968

- IFIP published its “Draft Report on the Algorithmic Language Algol 68.”
- Peter Nauer (who wrote the Algol 60 report) and Saul Rosen declared the report almost unreadable.

December 1969

- CSC acquired a second 7094 (used, of course).
- The original list was $2 million, we paid $24 thousand.
- It was dubbed the “oil 94.” Our other one was air cooled.

This presentation was brought to you by



NOTICE
FUNCTIONS WANTED

To: Graduate Students in Computer Sciences
From: John R. Rice

The NAPSS project needs a substantial number of functions to test its polyalgorithm for solving $F(x) = 0$. Could you help NAPSS out by supplying two or three functions to be put into a set of test functions? I would prefer to have real-life functions whose zeros you have actually wanted at some time. However, if you have not solved for the zeros of such a function, I am also interested in having a function whose zeros you would like to see. A description of what this polyalgorithm does and accepts is given on the next page.

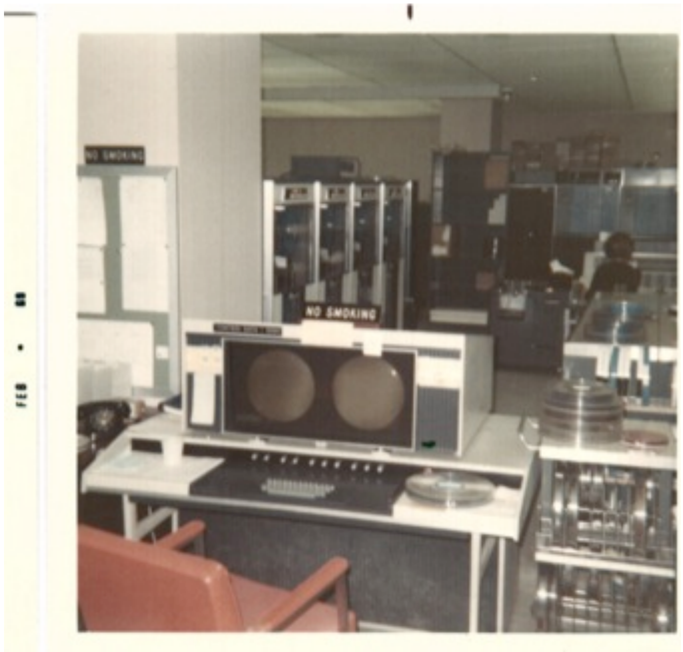
Note: Forms are attached for you to specify the functions. Hopefully, we can keypunch directly from these forms, so please be careful and neat. If you already have a function on cards, we can use the cards directly and would appreciate having them.

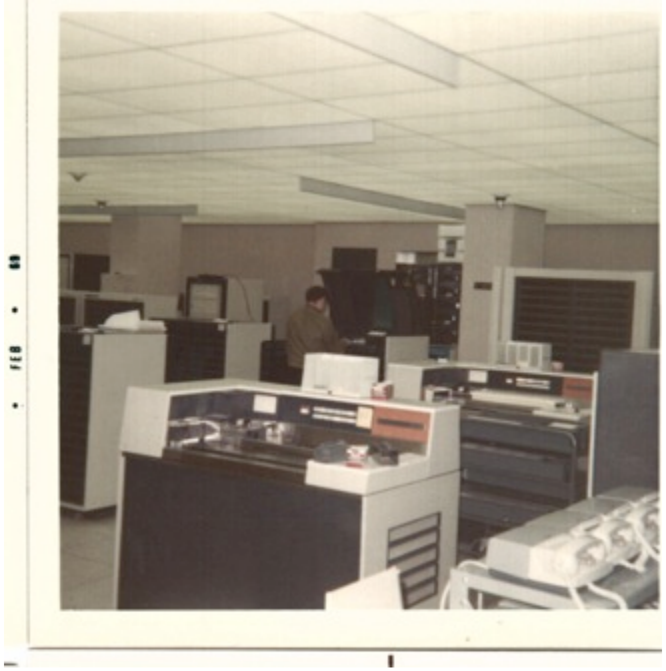
P.S. The graduate committee of the Computer Science Department has just adopted a new requirement for the M.S. and Ph.D. degrees: You have to file these forms for at least two functions.

More on the Computer Center

More on the Computer Center

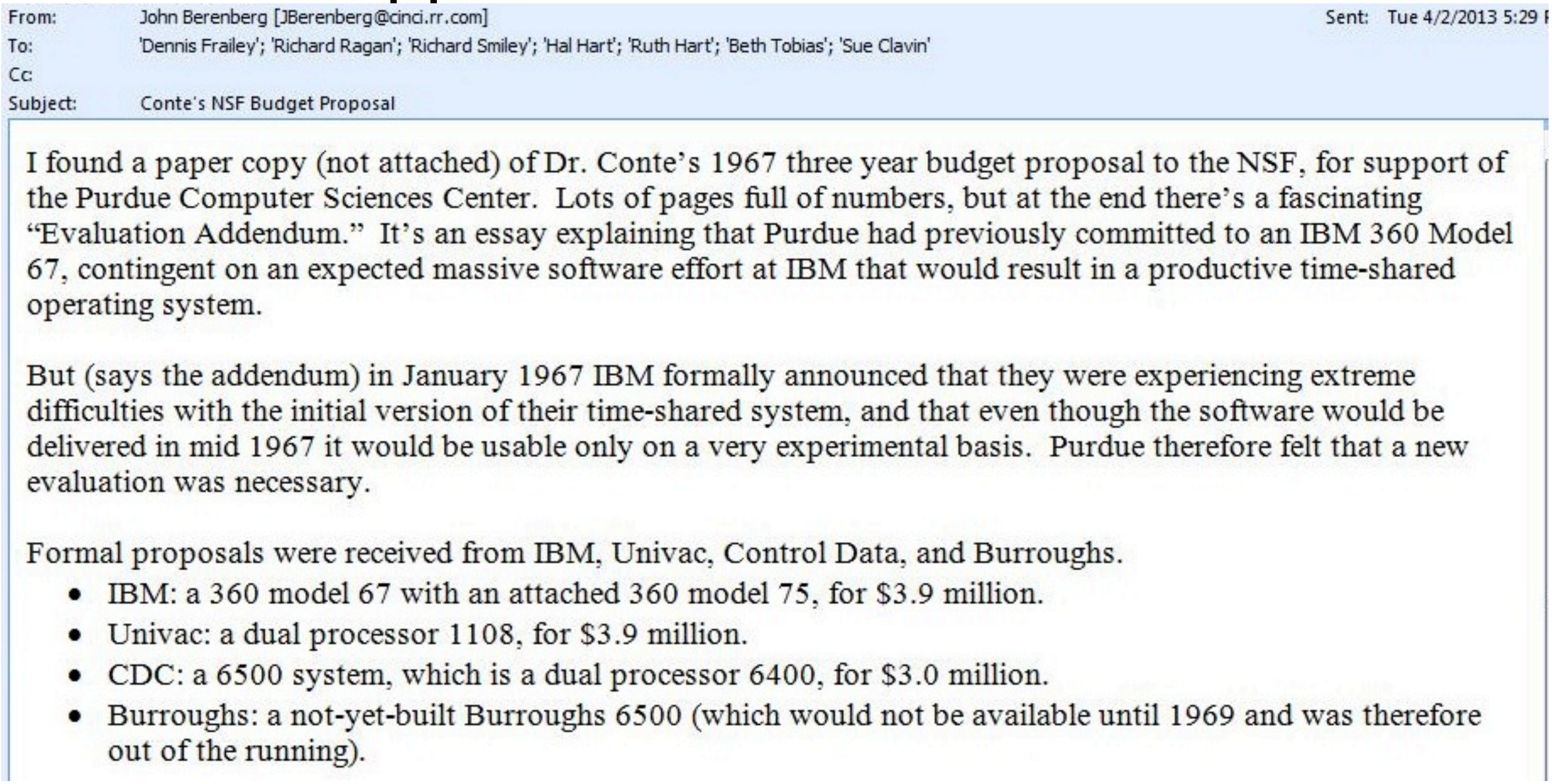
- There are more pictures & documents on our reunion website.





Why the CDC 6500 Instead of the IBM 360 Mod 67

- IBM dropped the ball. More is on our



From: John Berenberg [JBerenberg@cinci.rr.com]
Sent: Tue 4/2/2013 5:29
To: 'Dennis Frailey'; 'Richard Ragan'; 'Richard Smiley'; 'Hal Hart'; 'Ruth Hart'; 'Beth Tobias'; 'Sue Clavin'
Cc:
Subject: Conte's NSF Budget Proposal

I found a paper copy (not attached) of Dr. Conte's 1967 three year budget proposal to the NSF, for support of the Purdue Computer Sciences Center. Lots of pages full of numbers, but at the end there's a fascinating "Evaluation Addendum." It's an essay explaining that Purdue had previously committed to an IBM 360 Model 67, contingent on an expected massive software effort at IBM that would result in a productive time-shared operating system.

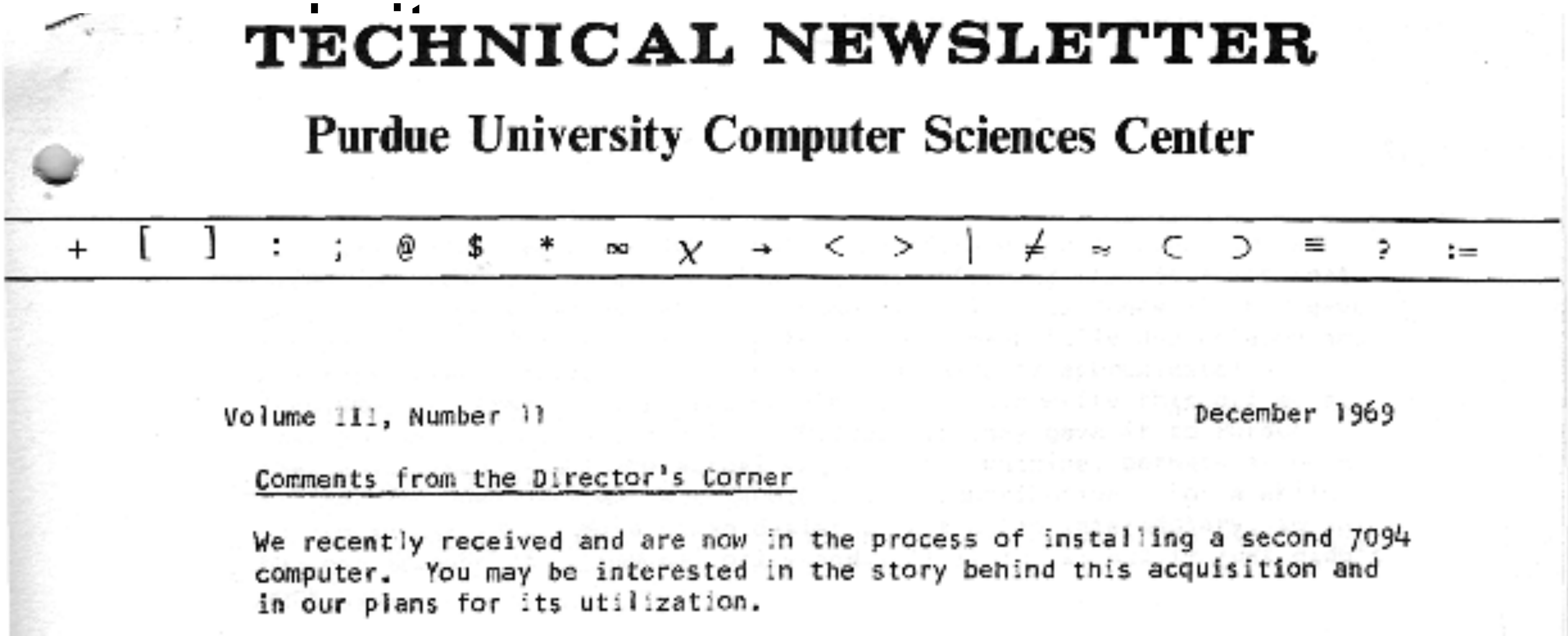
But (says the addendum) in January 1967 IBM formally announced that they were experiencing extreme difficulties with the initial version of their time-shared system, and that even though the software would be delivered in mid 1967 it would be usable only on a very experimental basis. Purdue therefore felt that a new evaluation was necessary.

Formal proposals were received from IBM, Univac, Control Data, and Burroughs.

- IBM: a 360 model 67 with an attached 360 model 75, for $3.9 million.
- Univac: a dual processor 1108, for $3.9 million.
- CDC: a 6500 system, which is a dual processor 6400, for $3.0 million.
- Burroughs: a not-yet-built Burroughs 6500 (which would not be available until 1969 and was therefore out of the running).

Always a Market for an IBM 7094

- Years after the CDC 6500 installation we bought a second IBM 7094. Dr. Saul Rosen explained why, in a document on



TECHNICAL NEWSLETTER

Purdue University Computer Sciences Center

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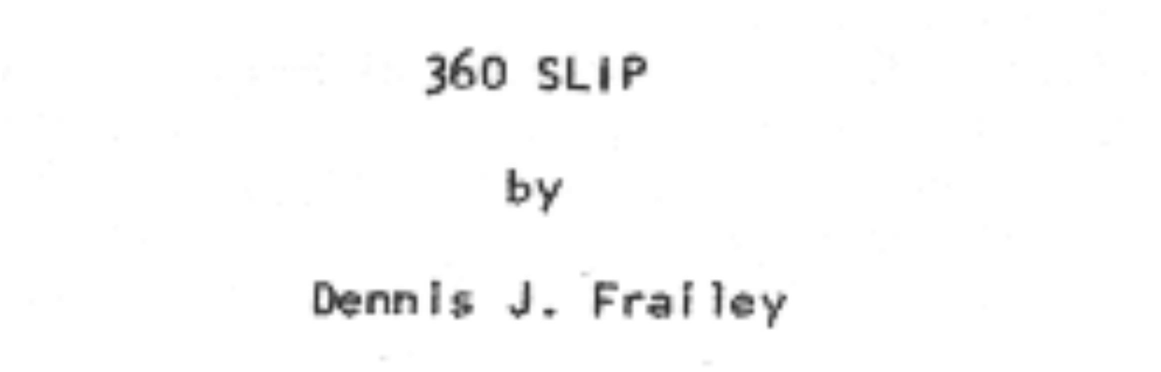
Volume III, Number 11 December 1969

Comments from the Director's Corner

We recently received and are now in the process of installing a second 7094 computer. You may be interested in the story behind this acquisition and in our plans for its utilization.

Students Enhanced the Computer Center’s Offerings

- We participated in the development of MACE
- We ported many programs to the new platforr



360 SLIP

by

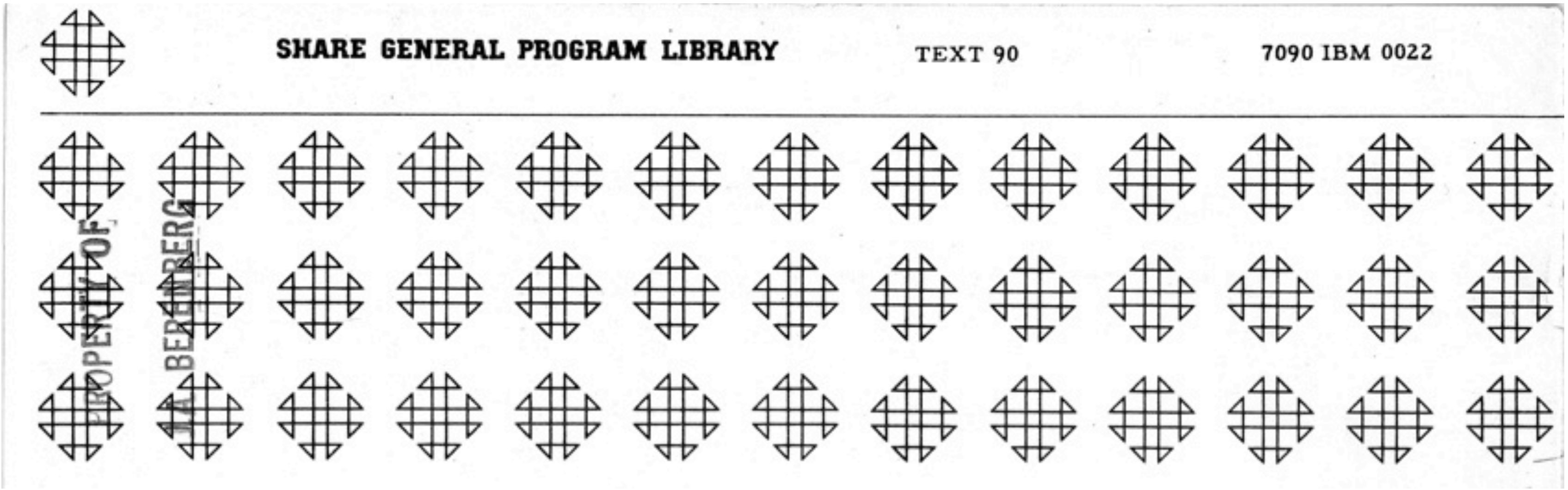
Dennis J. Frailey

- → See the slides on TEXT90 → TEXTJAB

So Glad You Enjoyed TEXTJAB

Originally there was TEXT90

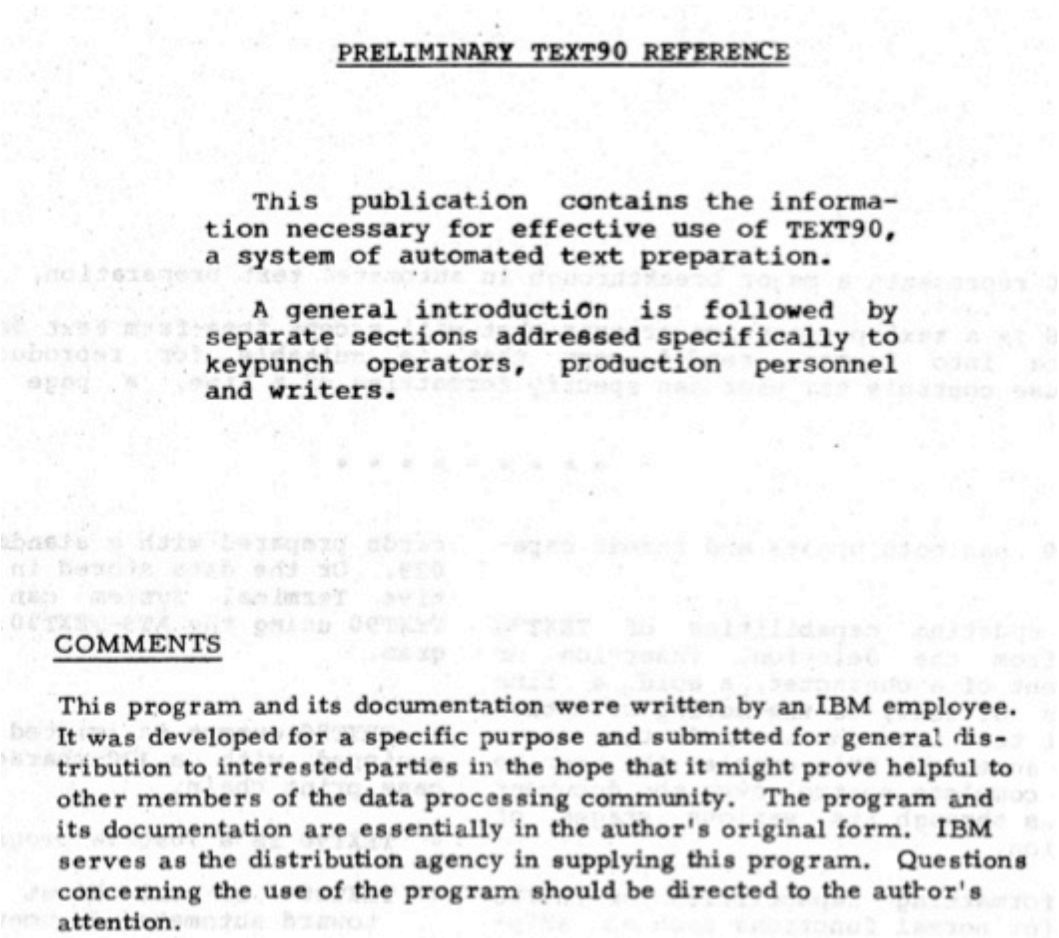
- A SHARE Users Group program that Purdue made available on its 7094.



SHARE GENERAL PROGRAM LIBRARY TEXT 90 7090 IBM 0022

Credit Where Credit is Due

- Originally written at IBM.



PRELIMINARY TEXT90 REFERENCE

This publication contains the information necessary for effective use of TEXT90, a system of automated text preparation.

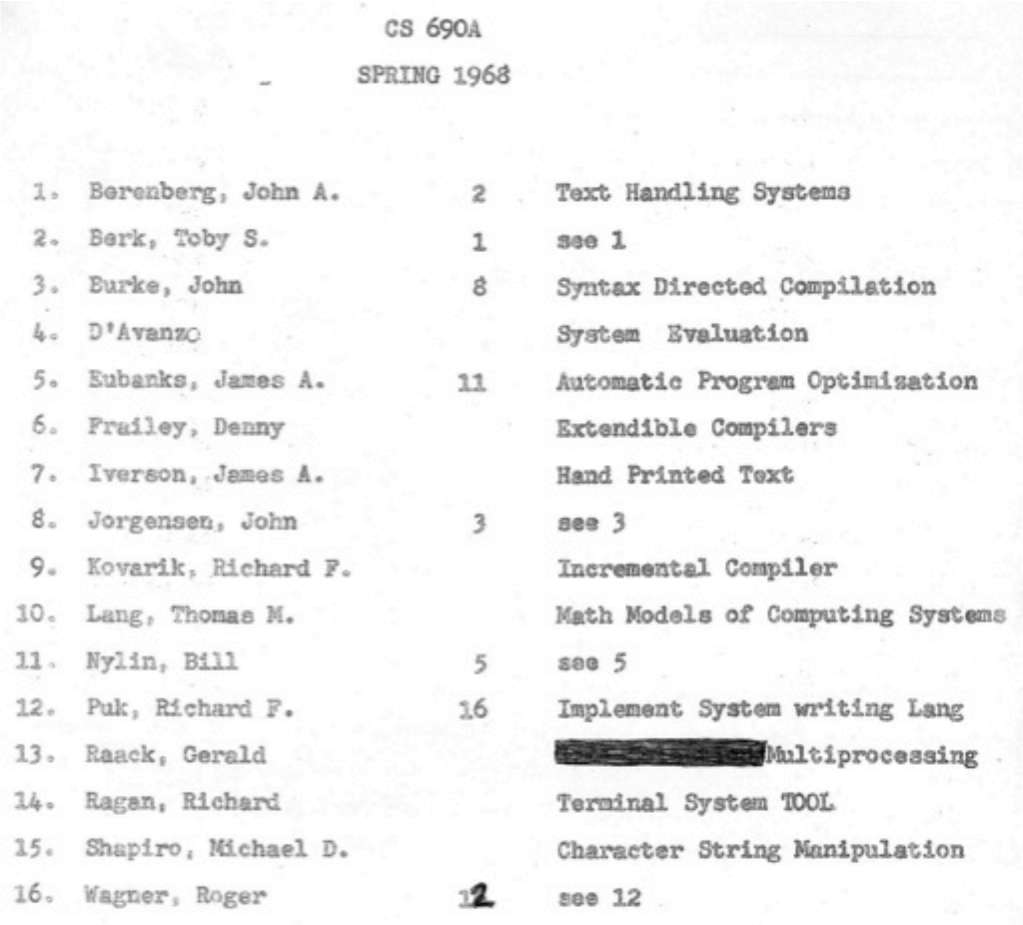
A general introduction is followed by separate sections addressed specifically to keypunch operators, production personnel and writers.

COMMENTS

This program and its documentation were written by an IBM employee. It was developed for a specific purpose and submitted for general distribution to interested parties in the hope that it might prove helpful to other members of the data processing community. The program and its documentation are essentially in the author's original form. IBM serves as the distribution agency in supplying this program. Questions concerning the use of the program should be directed to the author's attention.

So Then There Was This Seminar

- And you had to have a project …



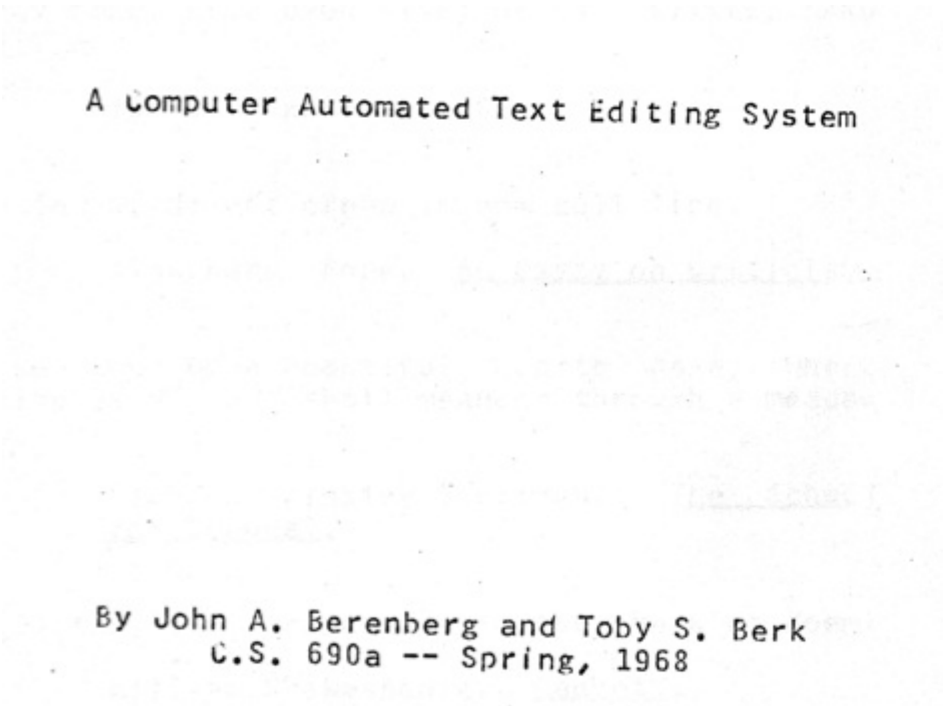
CS 690A

SPRING 1968

1.	Berenberg, John A.	2	Text Handling Systems
2.	Berk, Toby S.	1	see 1
3.	Burke, John	8	Syntax Directed Compilation
4.	D'Avanzo		System Evaluation
5.	Eubanks, James A.	11	Automatic Program Optimization
6.	Frailey, Denny		Extendible Compilers
7.	Iverson, James A.		Hand Printed Text
8.	Jorgensen, John	3	see 3
9.	Kovarik, Richard F.		Incremental Compiler
10.	Lang, Thomas M.		Math Models of Computing Systems
11.	Nylin, Bill	5	see 5
12.	Puk, Richard F.	16	Implement System writing Lang
13.	Raack, Gerald		[redacted] Multiprocessing
14.	Ragan, Richard		Terminal System TOOL
15.	Shapiro, Michael D.		Character String Manipulation
16.	Wagner, Roger	12	see 12

There Were *Two* Developers

- Don’t know why TSB deferred to JAB on naming rights.



A Computer Automated Text Editing System

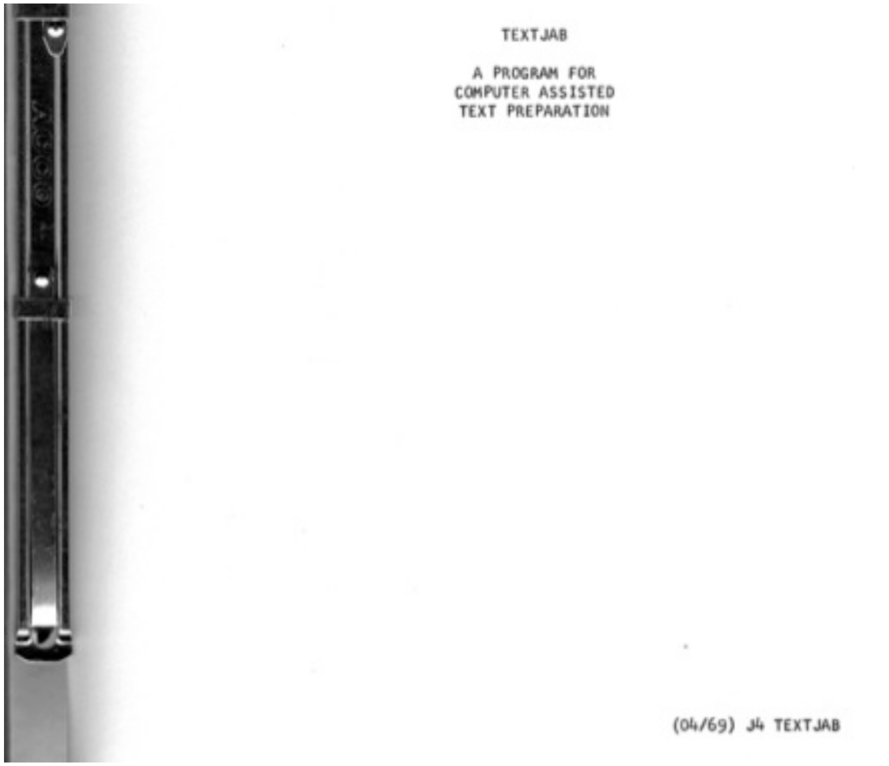
By John A. Berenberg and Toby S. Berk
C.S. 690a -- Spring, 1968

We Weren’t Humble

- A tech report from U of Maryland for the Office of Naval Research said “TEXT90 is the more sophisticated of a variety of text editing programs available.”
- *We* then proposed that, on the CDC 6500, “even a small addition to TEXT90 would give us the <u>most</u> sophisticated text editing program available.”

The TEXTJAB Manual Didn’t Say Who Wrote it

- The Manual was separate from the seminar project report. Maybe you were supposed to think JAB is an action verb.



TEXTJAB

A PROGRAM FOR
COMPUTER ASSISTED
TEXT PREPARATION

(04/69) J4 TEXTJAB

The Program Had a Life After JAB & TSB

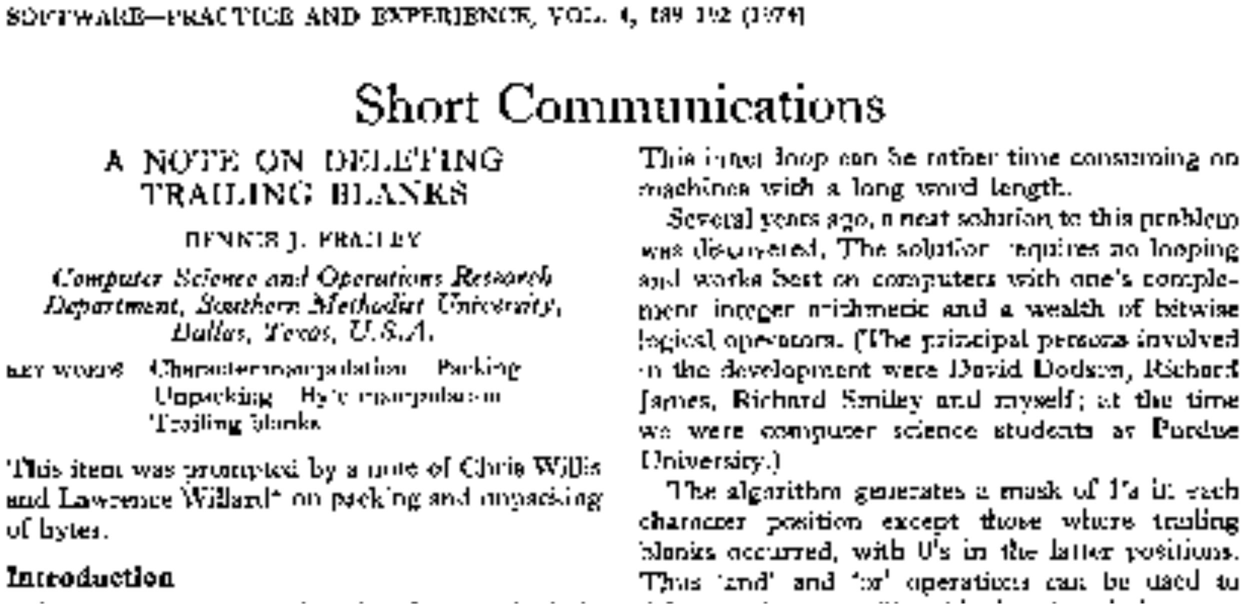
- In 1971 Michael D. Shapiro released TXTJABC to produce TEXTJAB output on the Gould 4800 Electrostatic Printer.
- And then …

The Program Had a Life After Purdue

- According to RRR:
  - “At least at CDC where I took it, it had a long and productive lifetime morphing from TEXTJAB to TXTCODE to TXTFORM to TEXTPRO (I think I got them all). Probably several thousand design etc documents were authored in it over the lifetime and special printer trains were created for it.”

The Trailing Blanks "competition"

- We were always collaboratively developing programming tricks, and one of them was a no-loop way to delete trailing blanks. DJF got an article out of it.



SOFTWARE—PRACTICE AND EXPERIENCE, VOL. 4, 189–192 (1974)

Short Communications

A NOTE ON DELETING TRAILING BLANKS

DENNIS J. FRAILEY

Computer Science and Operations Research Department, Southern Methodist University, Dallas, Texas, U.S.A.

KEY WORDS Character manipulation Packing Unpacking Byte manipulation Trailing blanks

This item was prompted by a note of Chris Willis and Lawrence Willard* on packing and unpacking of bytes.

Introduction

This inner loop can be rather time consuming on machines with a long word length.

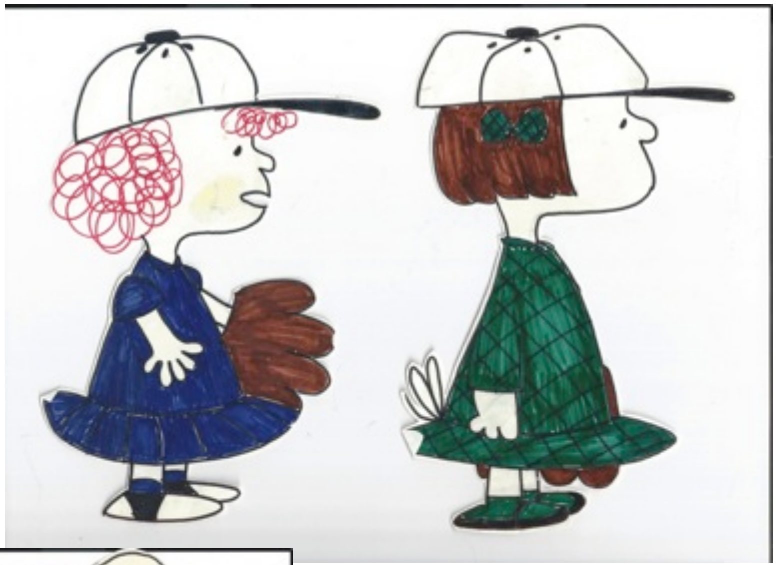
Several years ago, a neat solution to this problem was discovered. The solution requires no looping and works best on computers with one's complement integer arithmetic and a wealth of bitwise logical operators. (The principal persons involved in the development were David Dodson, Richard James, Richard Smiley and myself; at the time we were computer science students at Purdue University.)

The algorithm generates a mask of 1's in each character position except those where trailing blanks occurred, with 0's in the latter positions. Thus 'and' and 'or' operations can be used to

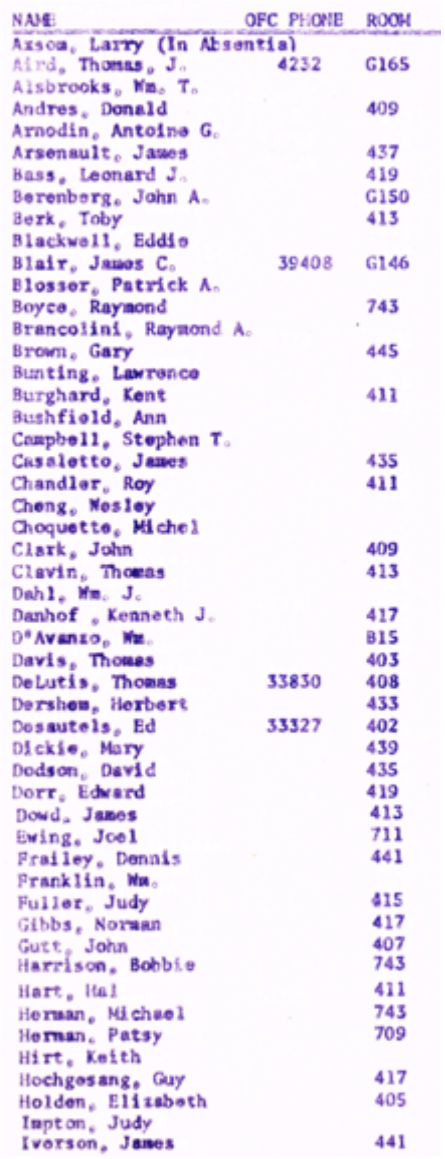
Dealing With the Bureaucracy

- Dave Zichterman / Zimmerman
- Door Decorating
- Frisbees
- …

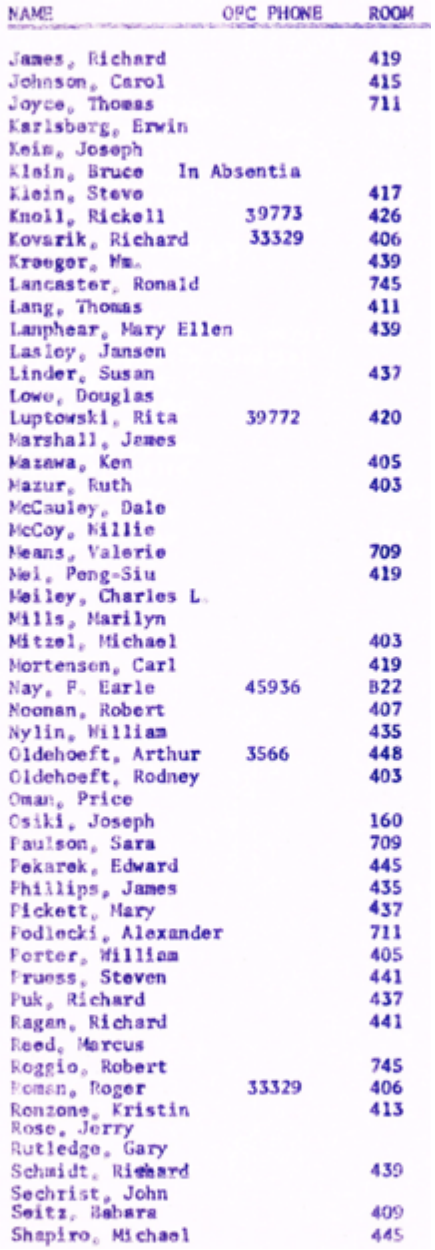
Door Decorations



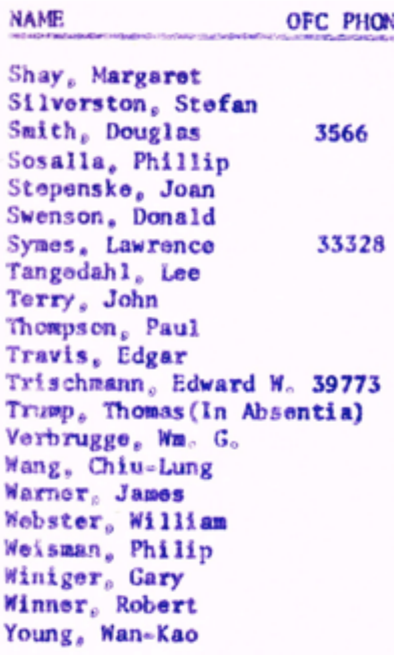
Graduate Students – Fall 1968



NAME	OFC PHONE	ROOM
Axsom, Larry (In Absentia)		
Aird, Thomas, J.	4232	G165
Alsbrooks, Wm. T.		
Andres, Donald		409
Arnodin, Antoine G.		
Arsenault, James		437
Bass, Leonard J.		419
Berenberg, John A.		G150
Berk, Toby		413
Blackwell, Eddie		
Blair, James C.	39408	G146
Blosser, Patrick A.		
Boyce, Raymond		743
Brancolini, Raymond A.		
Brown, Gary		445
Bunting, Lawrence		
Burghard, Kent		411
Bushfield, Ann		
Campbell, Stephen T.		
Casaletto, James		435
Chandler, Roy		411
Cheng, Wesley		
Choquette, Michel		
Clark, John		409
Clavin, Thomas		413
Dahl, Wm. J.		
Danhof , Kenneth J.		417
D'Avanzo, Wm.		B15
Davis, Thomas		403
DeLutis, Thomas	33830	408
Dershem, Herbert		433
Desautels, Ed	33327	402
Dickie, Mary		439
Dodson, David		435
Dorr, Edward		419
Dowd, James		413
Ewing, Joel		711
Frailey, Dennis		441
Franklin, Wm.		
Fuller, Judy		415
Gibbs, Norman		417
Gutt, John		407
Harrison, Bobbie		743
Hart, Hal		411
Herman, Michael		743
Herman, Patsy		709
Hirt, Keith		
Hochgesang, Guy		417
Holden, Elizabeth		405
Impton, Judy		
Iverson, James		441

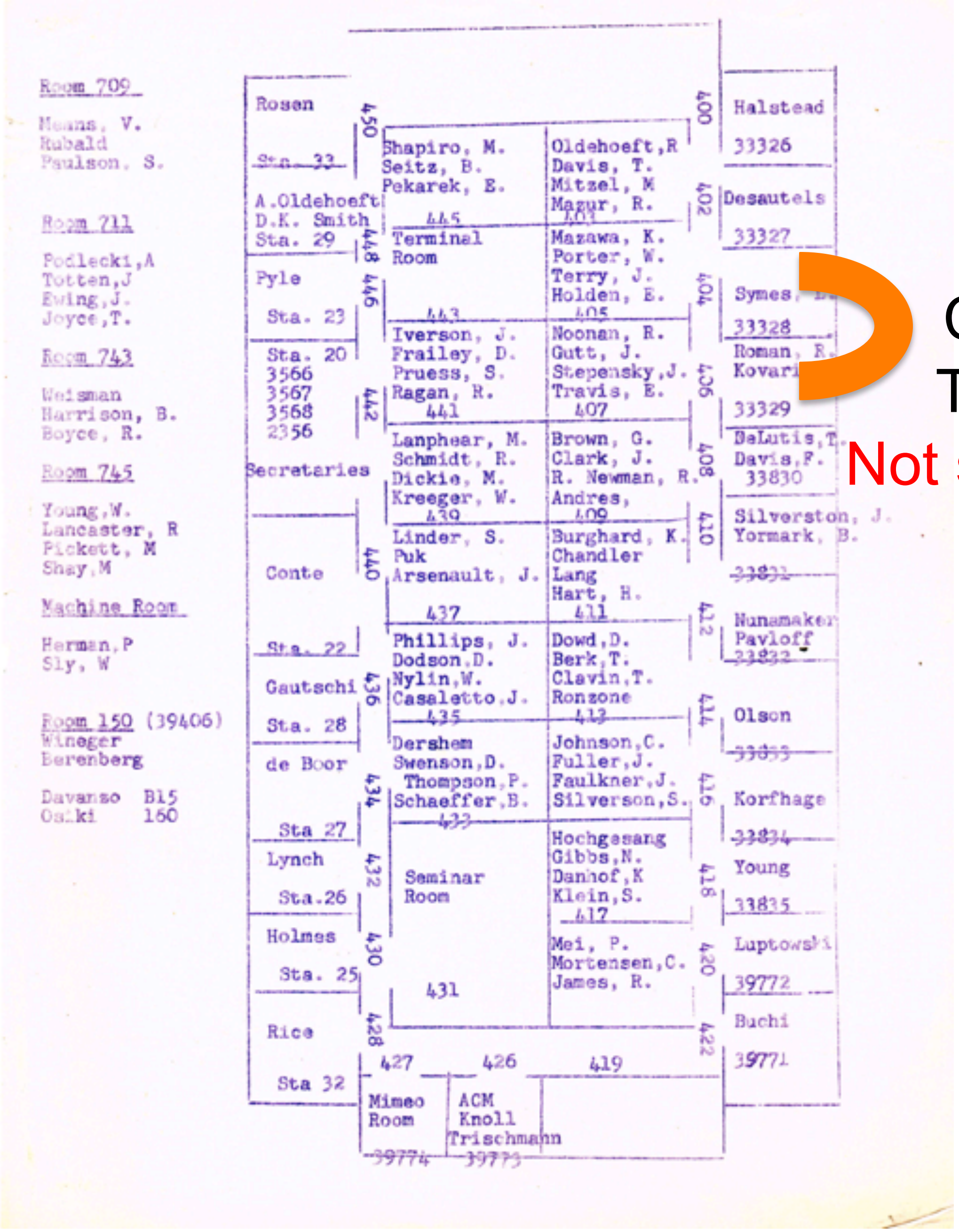


NAME	OFC PHONE	ROOM
James, Richard		419
Johnson, Carol		415
Joyce, Thomas		711
Karlsberg, Erwin		
Keim, Joseph		
Klein, Bruce	In Absentia	
Klein, Steve		417
Knoll, Rickell	39773	426
Kovarik, Richard	33329	406
Kreeger, Wm.		439
Lancaster, Ronald		745
Lang, Thomas		411
Lanphear, Mary Ellen		439
Lasley, Jansen		
Linder, Susan		437
Lowe, Douglas		
Luptowski, Rita	39772	420
Marshall, James		
Mazawa, Ken		405
Mazur, Ruth		403
McCauley, Dale		
McCoy, Willie		
Means, Valerie		709
Mei, Peng-Siu		419
Meiley, Charles L.		
Mills, Marilyn		
Mitzel, Michael		403
Mortensen, Carl		419
Nay, F. Earle	45936	B22
Noonan, Robert		407
Nylin, William		435
Oldehoeft, Arthur	3566	448
Oldehoeft, Rodney		403
Oman, Price		
Osiki, Joseph		160
Paulson, Sara		709
Pekarek, Edward		445
Phillips, James		435
Pickett, Mary		437
Podlecki, Alexander		711
Porter, William		405
Pruess, Steven		441
Puk, Richard		437
Ragan, Richard		441
Reed, Marcus		
Roggio, Robert		745
Roman, Roger	33329	406
Ronzone, Kristin		413
Rose, Jerry		
Rutledge, Gary		
Schmidt, Richard		439
Sechrist, John		
Seitz, Babara		409
Shapiro, Michael		445



NAME	OFC PHON
Shay, Margaret	
Silverston, Stefan	
Smith, Douglas	3566
Sosalla, Phillip	
Stepenske, Joan	
Swenson, Donald	
Symes, Lawrence	33328
Tangedahl, Lee	
Terry, John	
Thompson, Paul	
Travis, Edgar	
Trischmann, Edward W.	39773
Trump, Thomas(In Absentia)	
Verbrugge, Wm. G.	
Wang, Chiu-Lung	
Warner, James	
Webster, William	
Weisman, Philip	
Winiger, Gary	
Winner, Robert	
Young, Wan-Kao	

What was where?



Room 709

Means, V.
Rubald
Paulson, S.

Room 711

Podlecki, A
Totten, J
Ewing, J.
Joyce, T.

Room 743

Weisman
Harrison, B.
Boyce, R.

Room 745

Young, W.
Lancaster, R
Pickett, M
Shay, M

Machine Room

Herman, P
Sly, W

Room 150 (39406)
Wineger
Berenberg

Davanso	B15
Osaki	160

450 Rosen
Sta. 33

448 A.Oldehoeft
D.K. Smith
Sta. 29

446 Pyle
Sta. 23

442 Sta. 20
3566
3567
3568
2356
Secretaries

440 Conte
Sta. 22

436 Gautschi
Sta. 28

434 de Boor
Sta 27

432 Lynch
Sta.26

430 Holmes
Sta. 25

428 Rice
Sta 32

445 Shapiro, M.
Seitz, B.
Pekarek, E.

443 Terminal
Room

441 Iverson, J.
Frailey, D.
Pruess, S.
Ragan, R.

439 Lanphear, M.
Schmidt, R.
Dickie, M.
Kreeger, W.

437 Linder, S.
Puk
Arsenault, J.

435 Phillips, J.
Dodson, D.
Nylin, W.
Casaletto, J.

433 Dershem
Swenson, D.
Thompson, P.
Schaeffer, B.

431 Seminar
Room

403 Oldehoeft, R
Davis, T.
Mitzel, M
Mazur, R.

405 Mazawa, K.
Porter, W.
Terry, J.
Holden, E.

407 Noonan, R.
Gutt, J.
Stepensky, J.
Travis, E.

409 Brown, G.
Clark, J.
R. Newman, R.
Andres,

411 Burghard, K.
Chandler
Lang
Hart, H.

413 Dowd, D.
Berk, T.
Clavin, T.
Ronzone

Johnson, C.
Fuller, J.
Faulkner, J.
Silverson, S.

417 Hochgesang
Gibbs, N.
Danhof, K
Klein, S.

Mei, P.
Mortensen, C.
James, R.

427 Mimeo
Room
39774

426 ACM
Knoll
Trischmann
39773

419

400 Halstead
33326

402 Desautels
33327

404 Symes,
33328

406 Roman, R.
Kovari
33329

408 DeLutis, T.
Davis, F.
33830

410 Silverston, J.
Yormark, B.
~~33831~~

412 Nunamaker
Pavloff
33832

414 Olson
~~33833~~

416 Korfhage
~~33834~~

418 Young
33835

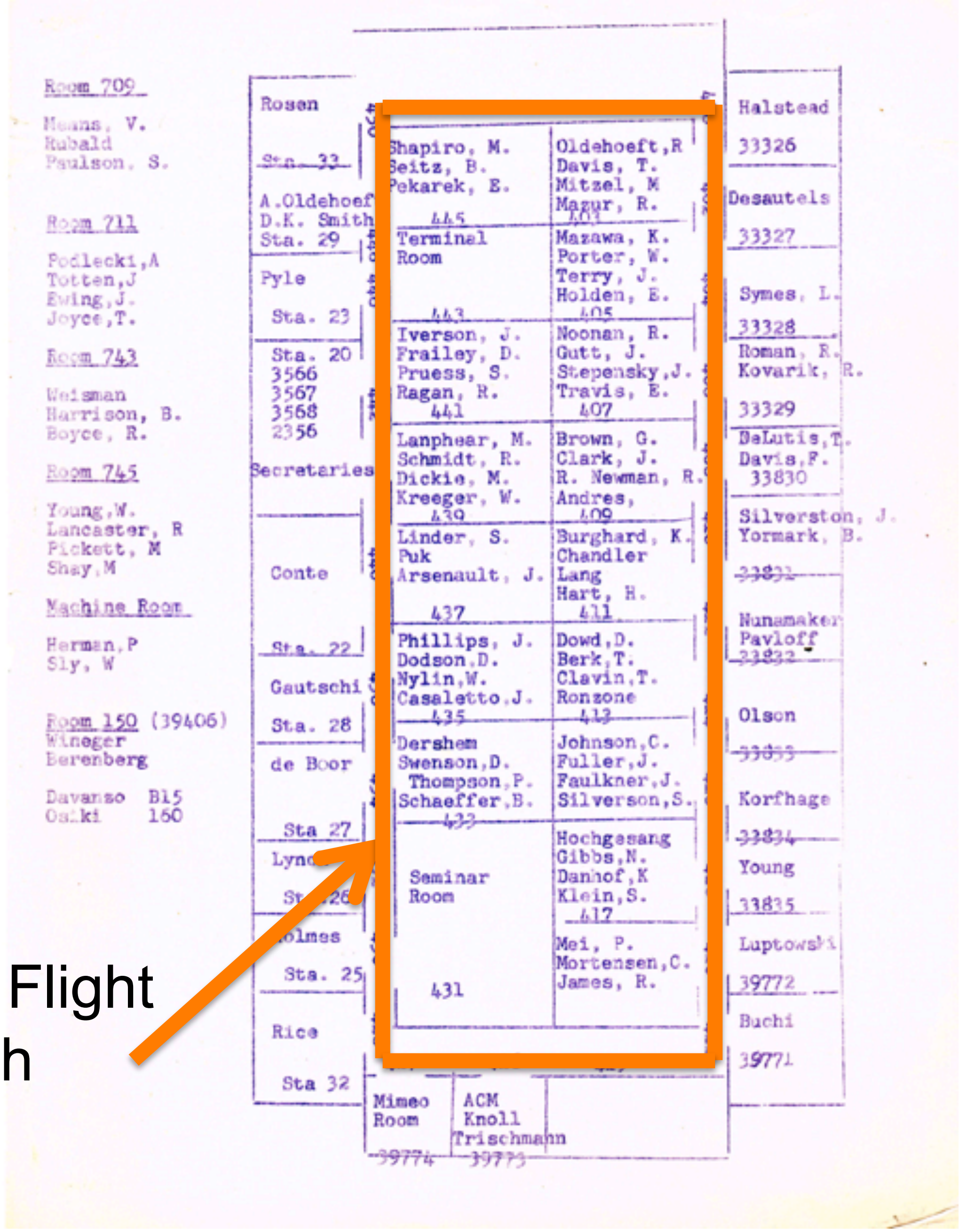
420 Luptowski
39772

422 Buchi
39771

Cross wired Thermostats

Not sure which pair of offices

What was where?



Room 709

Means, V.
Rubald
Paulson, S.

Room 711

Podlecki,A
Totten,J
Ewing,J.
Joyce,T.

Room 743

Weisman
Harrison, B.
Boyce, R.

Room 745

Young,W.
Lancaster, R
Pickett, M
Shay,M

Machine Room

Herman,P
Sly, W

Room 150 (39406)
Wineger
Berenberg

Davanso B15
Osaki 160

Rosen
Sta. 33

A.Oldehoef
D.K. Smith
Sta. 29

Pyle
Sta. 23

Sta. 20
3566
3567
3568
2356

Secretaries

Conte
Sta. 22

Gautschi
Sta. 28

de Boor
Sta 27

Lync
St 26

olmes
Sta. 25

Rice
Sta 32

Shapiro, M.
Seitz, B.
Pekarek, E.
445

Terminal
Room
443

Iverson, J.
Frailey, D.
Pruess, S.
Ragan, R.
441

Lanphear, M.
Schmidt, R.
Dickie, M.
Kreeger, W.
439

Linder, S.
Puk
Arsenault, J.
437

Phillips, J.
Dodson,D.
Nylin,W.
Casaletto,J.
435

Dershem
Swenson,D.
Thompson,P.
Schaeffer,B.
433

Seminar
Room
431

Oldehoeft,R
Davis, T.
Mitzel, M
Mazur, R.
403

Mazawa, K.
Porter, W.
Terry, J.
Holden, E.
405

Noonan, R.
Gutt, J.
Stepensky,J.
Travis, E.
407

Brown, G.
Clark, J.
R. Newman, R.
Andres,
409

Burghard, K.
Chandler
Lang
Hart, H.
411

Dowd,D.
Berk,T.
Clavin,T.
Ronzone
413

Johnson,C.
Fuller,J.
Faulkner,J.
Silverson,S.

Hochgesang
Gibbs,N.
Danhof,K
Klein,S.
417

Mei, P.
Mortensen,C.
James, R.

Halstead
33326

Desautels
33327

Symes, L.
33328

Roman, R.
Kovarik, R.
33329

DeLutis,T.
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33830

Silverston, J.
Yormark, B.
33831

Nunamaker
Pavloff
33832

Olson
33833

Korfhage
33834

Young
33835

Luptowski
39772

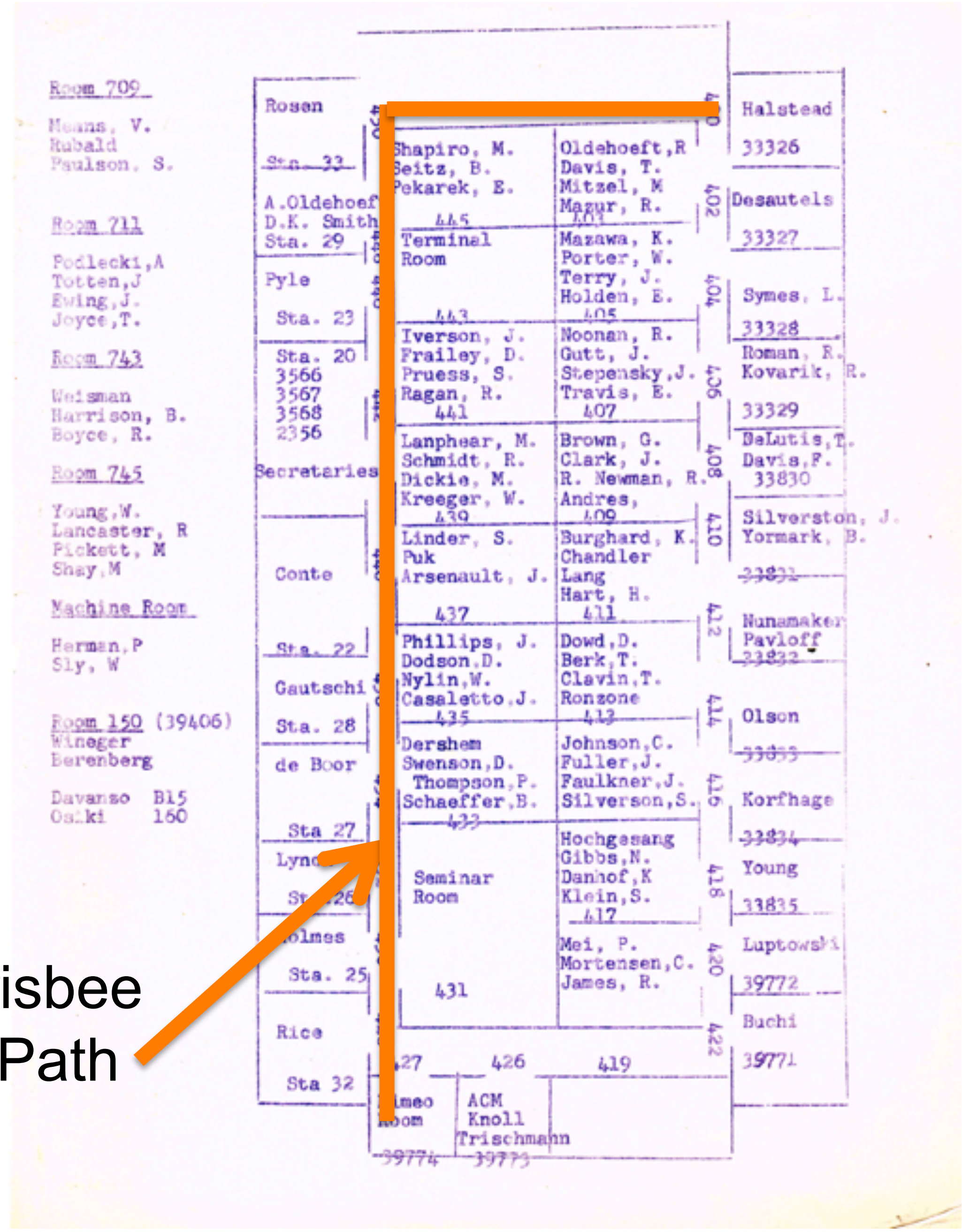
Buchi
39771

Mimeo
Room
39774

ACM
Knoll
Trischmann
39773

Frisbee Flight
Path

What was where?



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Sly, W

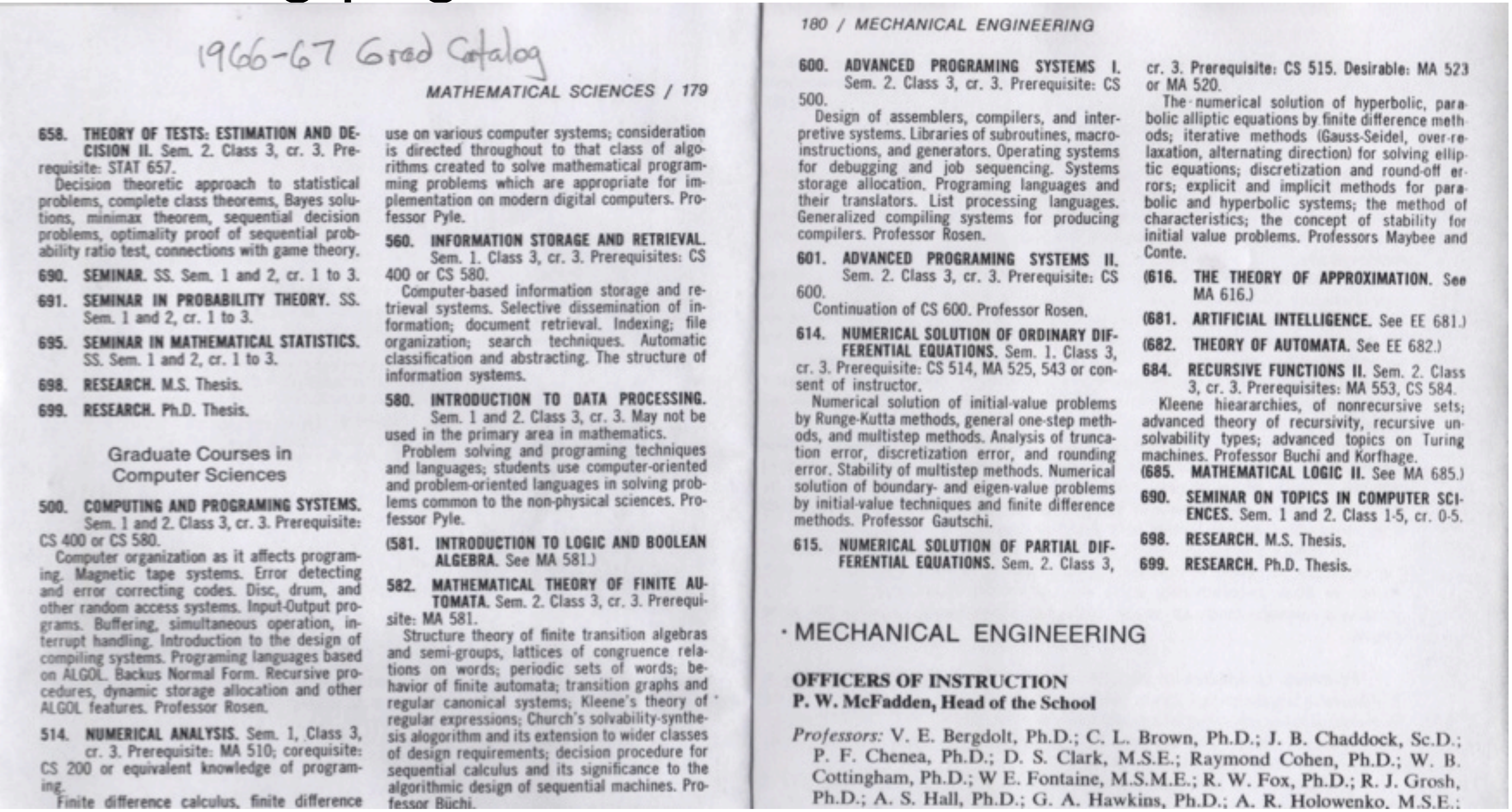
Room 150 (39406)
Wineger
Berenberg

Davanso	B15
Osaki	160

Lost Frisbee Flight Path

The Classes

- Catalog page is on our website



1966-67 Grad Catalog

MATHEMATICAL SCIENCES / 179

658. THEORY OF TESTS: ESTIMATION AND DECISION II. Sem. 2. Class 3, cr. 3. Prerequisite: STAT 657.

Decision theoretic approach to statistical problems, complete class theorems, Bayes solutions, minimax theorem, sequential decision problems, optimality proof of sequential probability ratio test, connections with game theory.

690. SEMINAR. SS. Sem. 1 and 2, cr. 1 to 3.

691. SEMINAR IN PROBABILITY THEORY. SS. Sem. 1 and 2, cr. 1 to 3.

695. SEMINAR IN MATHEMATICAL STATISTICS. SS. Sem. 1 and 2, cr. 1 to 3.

698. RESEARCH. M.S. Thesis.

699. RESEARCH. Ph.D. Thesis.

Graduate Courses in Computer Sciences

500. COMPUTING AND PROGRAMING SYSTEMS. Sem. 1 and 2. Class 3, cr. 3. Prerequisite: CS 400 or CS 580.

Computer organization as it affects programing. Magnetic tape systems. Error detecting and error correcting codes. Disc, drum, and other random access systems. Input-Output programs. Buffering, simultaneous operation, interrupt handling. Introduction to the design of compiling systems. Programing languages based on ALGOL. Backus Normal Form. Recursive procedures, dynamic storage allocation and other ALGOL features. Professor Rosen.

514. NUMERICAL ANALYSIS. Sem. 1, Class 3, cr. 3. Prerequisite: MA 510; corequisite: CS 200 or equivalent knowledge of programing.

Finite difference calculus, finite difference use on various computer systems; consideration is directed throughout to that class of algorithms created to solve mathematical programming problems which are appropriate for implementation on modern digital computers. Professor Pyle.

560. INFORMATION STORAGE AND RETRIEVAL. Sem. 1. Class 3, cr. 3. Prerequisites: CS 400 or CS 580.

Computer-based information storage and retrieval systems. Selective dissemination of information; document retrieval. Indexing; file organization; search techniques. Automatic classification and abstracting. The structure of information systems.

580. INTRODUCTION TO DATA PROCESSING. Sem. 1 and 2. Class 3, cr. 3. May not be used in the primary area in mathematics.

Problem solving and programing techniques and languages; students use computer-oriented and problem-oriented languages in solving problems common to the non-physical sciences. Professor Pyle.

(581. **INTRODUCTION TO LOGIC AND BOOLEAN ALGEBRA.** See MA 581.)

582. MATHEMATICAL THEORY OF FINITE AUTOMATA. Sem. 2. Class 3, cr. 3. Prerequisite: MA 581.

Structure theory of finite transition algebras and semi-groups, lattices of congruence relations on words; periodic sets of words; behavior of finite automata; transition graphs and regular canonical systems; Kleene's theory of regular expressions; Church's solvability-synthesis alogorithm and its extension to wider classes of design requirements; decision procedure for sequential calculus and its significance to the algorithmic design of sequential machines. Professor Büchi.

180 / MECHANICAL ENGINEERING

600. ADVANCED PROGRAMING SYSTEMS I. Sem. 2. Class 3, cr. 3. Prerequisite: CS 500.

Design of assemblers, compilers, and interpretive systems. Libraries of subroutines, macro-instructions, and generators. Operating systems for debugging and job sequencing. Systems storage allocation. Programing languages and their translators. List processing languages. Generalized compiling systems for producing compilers. Professor Rosen.

601. ADVANCED PROGRAMING SYSTEMS II. Sem. 2. Class 3, cr. 3. Prerequisite: CS 600.

Continuation of CS 600. Professor Rosen.

614. NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS. Sem. 1. Class 3, cr. 3. Prerequisite: CS 514, MA 525, 543 or consent of instructor.

Numerical solution of initial-value problems by Runge-Kutta methods, general one-step methods, and multistep methods. Analysis of truncation error, discretization error, and rounding error. Stability of multistep methods. Numerical solution of boundary- and eigen-value problems by initial-value techniques and finite difference methods. Professor Gautschi.

615. NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS. Sem. 2. Class 3, cr. 3. Prerequisite: CS 515. Desirable: MA 523 or MA 520.

The numerical solution of hyperbolic, parabolic alliptic equations by finite difference methods; iterative methods (Gauss-Seidel, over-relaxation, alternating direction) for solving elliptic equations; discretization and round-off errors; explicit and implicit methods for parabolic and hyperbolic systems; the method of characteristics; the concept of stability for initial value problems. Professors Maybee and Conte.

(616. **THE THEORY OF APPROXIMATION.** See MA 616.)

(681. **ARTIFICIAL INTELLIGENCE.** See EE 681.)

(682. **THEORY OF AUTOMATA.** See EE 682.)

684. RECURSIVE FUNCTIONS II. Sem. 2. Class 3, cr. 3. Prerequisites: MA 553, CS 584.

Kleene hieararchies, of nonrecursive sets; advanced theory of recursivity, recursive unsolvability types; advanced topics on Turing machines. Professor Buchi and Korfhage.

(685. **MATHEMATICAL LOGIC II.** See MA 685.)

690. SEMINAR ON TOPICS IN COMPUTER SCIENCES. Sem. 1 and 2. Class 1-5, cr. 0-5.

698. RESEARCH. M.S. Thesis.

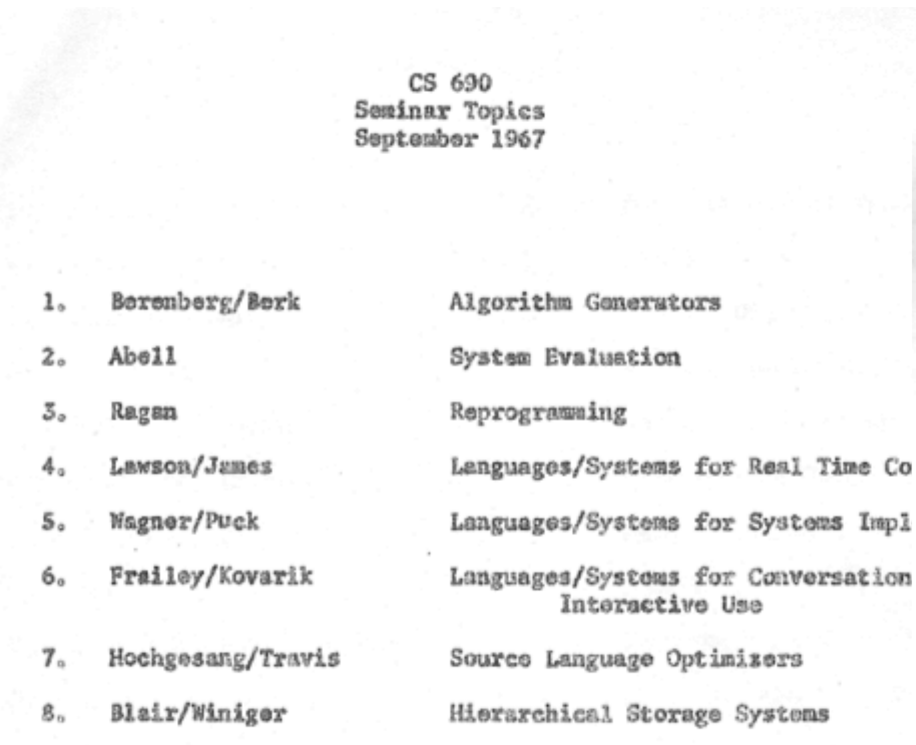
699. RESEARCH. Ph.D. Thesis.

· MECHANICAL ENGINEERING

OFFICERS OF INSTRUCTION
P. W. McFadden, Head of the School

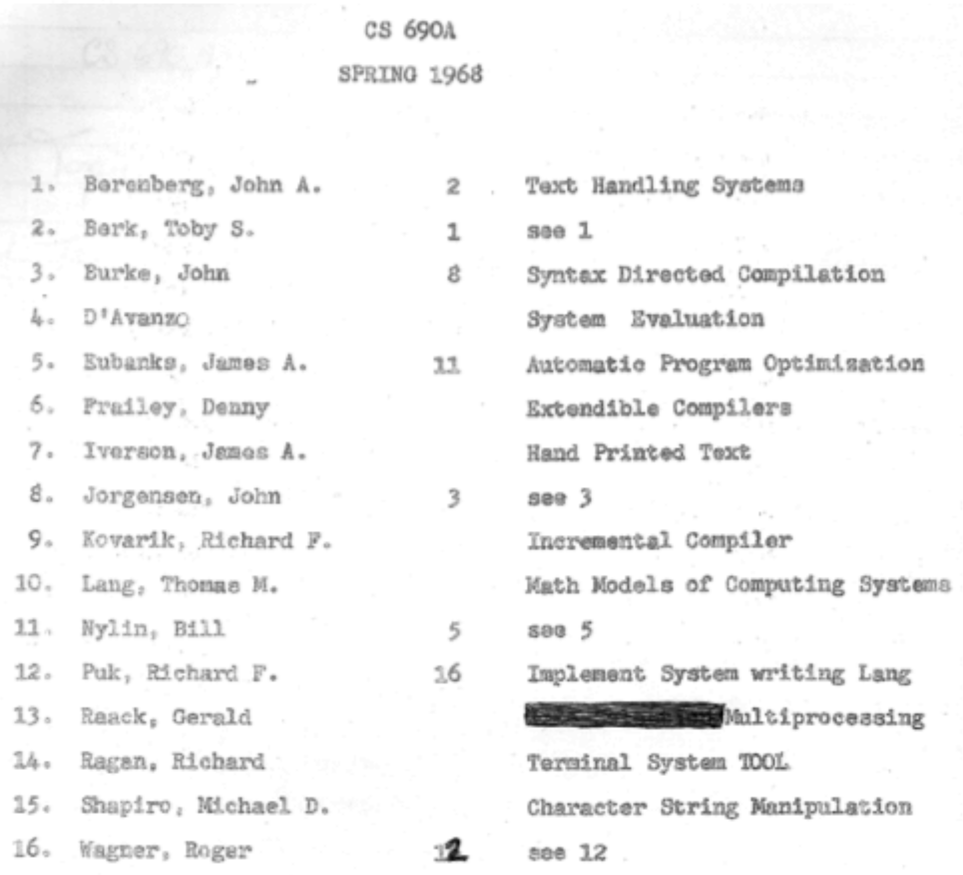
Professors: V. E. Bergdolt, Ph.D.; C. L. Brown, Ph.D.; J. B. Chaddock, Sc.D.; P. F. Chenea, Ph.D.; D. S. Clark, M.S.E.; Raymond Cohen, Ph.D.; W. B. Cottingham, Ph.D.; W E. Fontaine, M.S.M.E.; R. W. Fox, Ph.D.; R. J. Grosh, Ph.D.; A. S. Hall, Ph.D.; G. A. Hawkins, Ph.D.; A. R. Holowenko, M.S.E.;

Seminars



CS 690
Seminar Topics
September 1967

1.	Borenberg/Berk	Algorithm Generators
2.	Abell	System Evaluation
3.	Ragan	Reprogramming
4.	Lawson/James	Languages/Systems for Real Time Co
5.	Wagner/Puck	Languages/Systems for Systems Impl
6.	Frailey/Kovarik	Languages/Systems for Conversation Interactive Use
7.	Hochgesang/Travis	Source Language Optimizers
8.	Blair/Winiger	Hierarchical Storage Systems

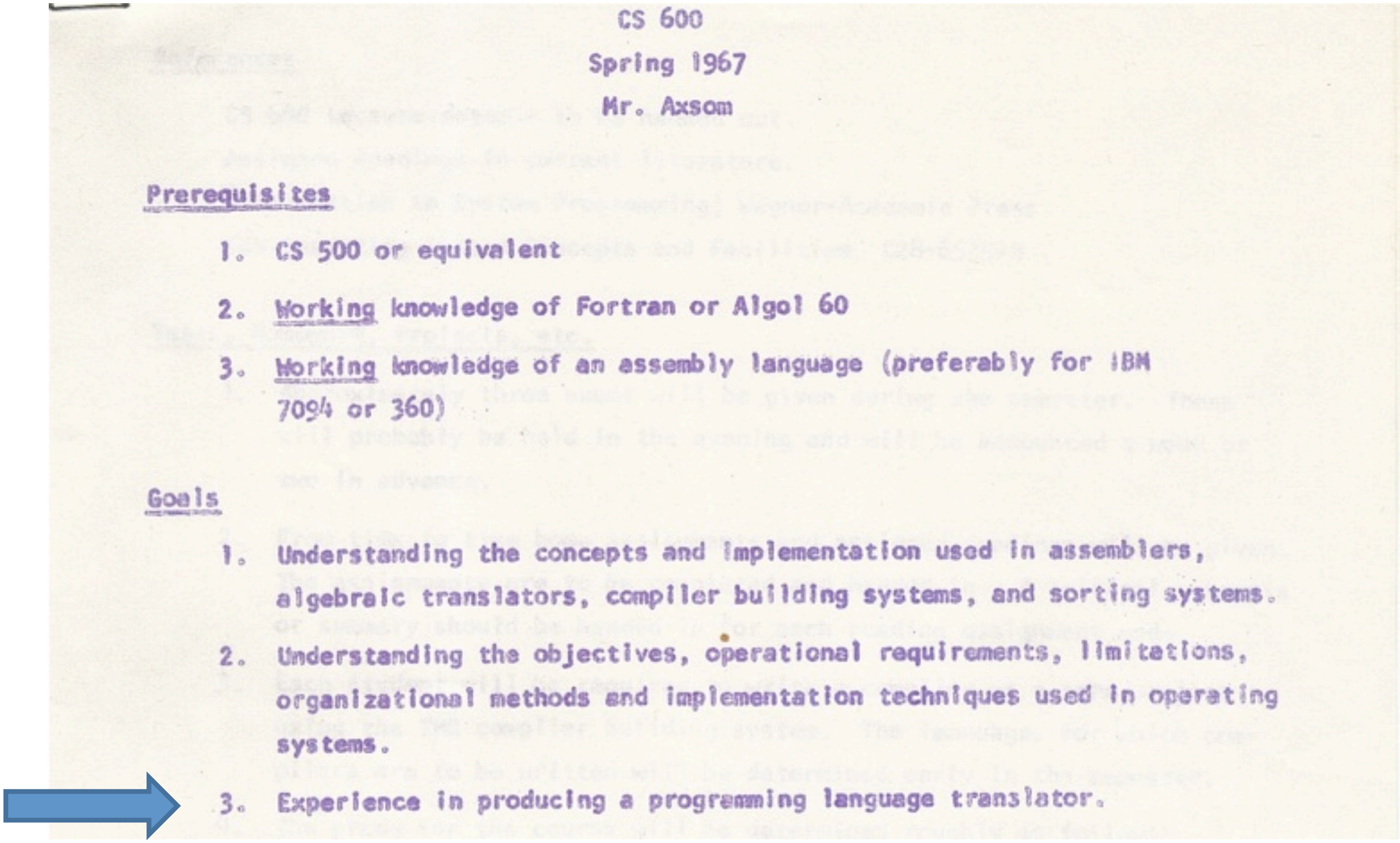


CS 690A

SPRING 1968

1.	Borenberg, John A.	2	Text Handling Systems
2.	Berk, Toby S.	1	see 1
3.	Burke, John	8	Syntax Directed Compilation
4.	D'Avanzo		System Evaluation
5.	Eubanks, James A.	11	Automatic Program Optimization
6.	Frailey, Denny		Extendible Compilers
7.	Iverson, James A.		Hand Printed Text
8.	Jorgensen, John	3	see 3
9.	Kovarik, Richard F.		Incremental Compiler
10.	Lang, Thomas M.		Math Models of Computing Systems
11.	Nylin, Bill	5	see 5
12.	Puk, Richard F.	16	Implement System writing Lang
13.	Raack, Gerald		[redacted] Multiprocessing
14.	Ragan, Richard		Terminal System TOOL
15.	Shapiro, Michael D.		Character String Manipulation
16.	Wagner, Roger	12	see 12

CS 600 in 1967



CS 600

Spring 1967

Mr. Axsom

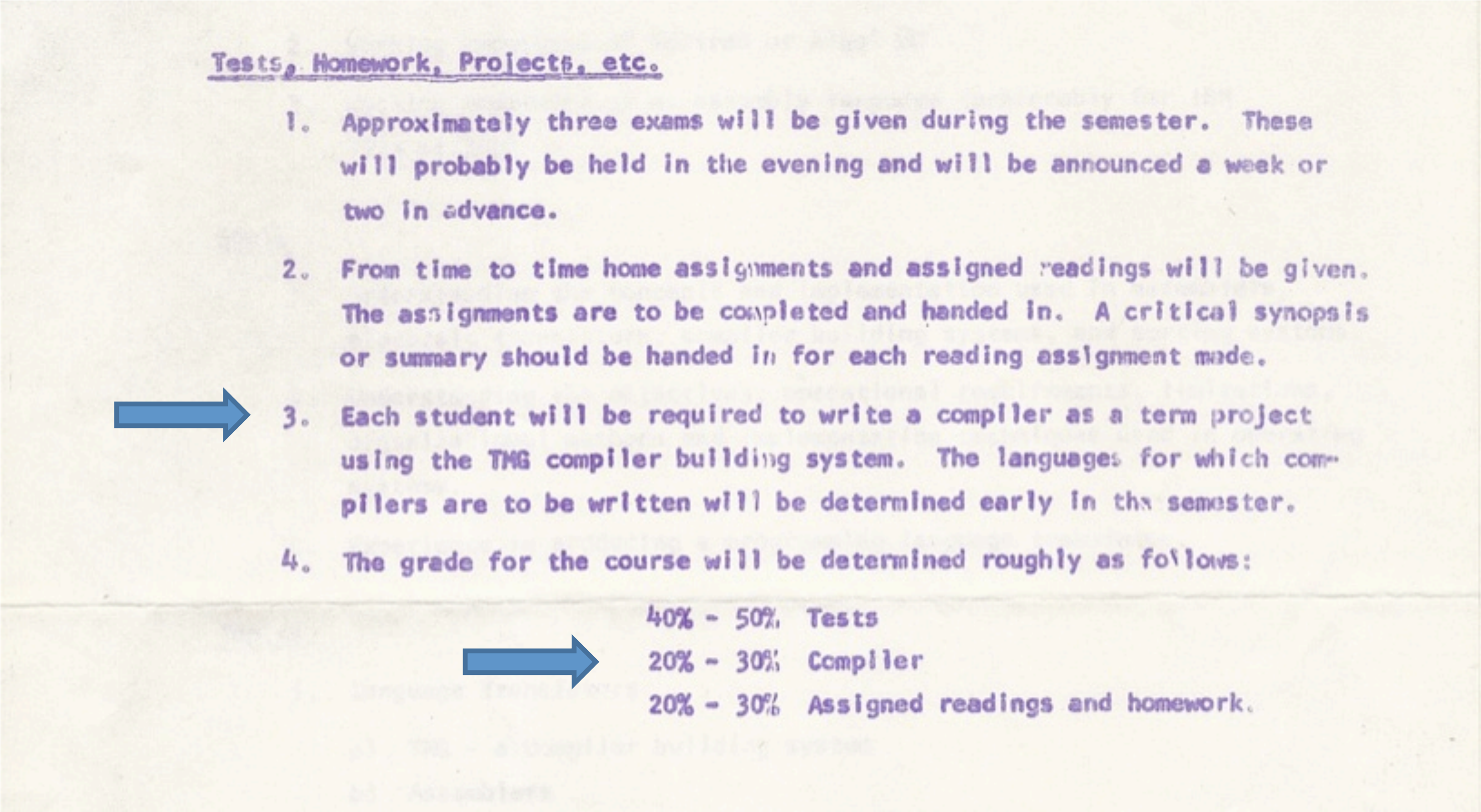
Prerequisites

1. CS 500 or equivalent
2. Working knowledge of Fortran or Algol 60
3. Working knowledge of an assembly language (preferably for IBM 7094 or 360)

Goals

1. Understanding the concepts and implementation used in assemblers, algebraic translators, compiler building systems, and sorting systems.
2. Understanding the objectives, operational requirements, limitations, organizational methods and implementation techniques used in operating systems.
3. Experience in producing a programming language translator.

CS 600 in 1967



Tests, Homework, Projects, etc.

1. Approximately three exams will be given during the semester. These will probably be held in the evening and will be announced a week or two in advance.

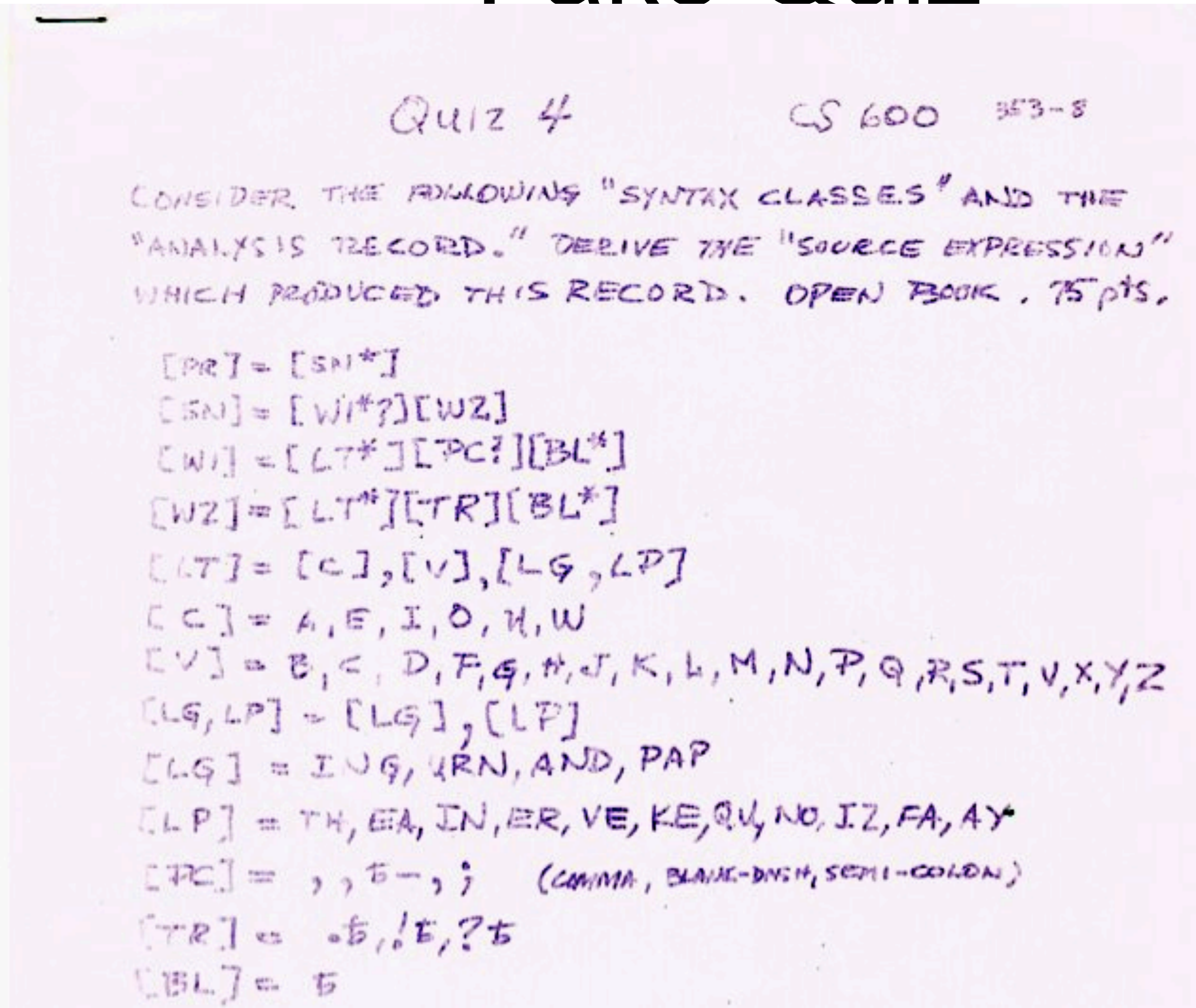
2. From time to time home assignments and assigned readings will be given. The assignments are to be completed and handed in. A critical synopsis or summary should be handed in for each reading assignment made.

3. Each student will be required to write a compiler as a term project using the TMG compiler building system. The languages for which compilers are to be written will be determined early in the semester.

4. The grade for the course will be determined roughly as follows:

40% - 50%	Tests
20% - 30%	Compiler
20% - 30%	Assigned readings and homework.

Fake Quiz



QUIZ 4 CS 600 353-8

CONSIDER THE FOLLOWING "SYNTAX CLASSES" AND THE "ANALYSIS RECORD." DERIVE THE "SOURCE EXPRESSION" WHICH PRODUCED THIS RECORD. OPEN BOOK. 75 pts.

```
[PR] = [SN*]
[SN] = [W1*?][WZ]
[W1] = [LT*][PC?][BL*]
[WZ] = [LT*][TR][BL*]
[LT] = [C],[V],[LG,LP]
[C] = A, E, I, O, U, W
[V] = B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, X, Y, Z
[LG, LP] = [LG],[LP]
[LG] = ING, URN, AND, PAP
[LP] = TH, EA, IN, ER, VE, KE, QU, NO, IZ, FA, AY
[PC] = ,, ƀ-, ;   (COMMA, BLANK-DASH, SEMI-COLON)
[TR] = .ƀ, !ƀ, ?ƀ
[BL] = ƀ
```