The IEEE Computer Society's Fifth International

Computer Software & Applications Conference

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- John Staudhammer
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Programming Productivity: Issues for the Eighties
Capers Jones, Lecturer
Monday, November 16, 1981
9:00 a.m.-5:00 p.m.

Instructor: Capers Jones

Audience: Intended for software managers and practitioners who are interested in quantified information on the impacts of new programming technologies on software costs, quality levels, and schedule adherences.

Course Description: Programming productivity gains can result from synergistic combinations of technologies, environmental factors, and the growing level of software expertise throughout typical enterprises. Selecting the right combination and predicting accurate results are difficult. The commonest software measurements in the industry are paradoxical and misleading, and both new metric approaches and planned corrections can overcome the historical measurement problems. The course discusses the intertwined issues of technologies, estimating, and measurement.

Course Outline:
Program Quality and Productivity: Industry ranges for software quality • software cost elements • reliability • software defect causes • the high cost of software paperwork • technology selection and technology transfer

Analysis of Common Metrics for Software: Paradoxical results from using “lines of code” measures • new directions in software metrics • operator/operand metrics • function metrics • structural metrics • value metrics and future metric issues

Programming Architectures and Design Languages: Function analysis versus data analysis architectures • survey of specification languages • pros and cons of character-string languages • pros and cons of graphical languages • new directions in hybrid text/graphics languages • long-range prognosis for dynamic multidimensional specification methods

Capers Jones is currently manager of programming technology transfer at ITT’s Programming Technology Center in Stratford, Connecticut. He is responsible for programming technology evaluation and distribution to ensure that optimum methods are used on key software projects throughout ITT. Capers has published over thirty articles on software quality, productivity, and schedule estimating. He has a BA in English from the University of Florida, and has done research in linguistic structures of software design languages.

Software Verification
W. Howden, Lecturer
Monday, November 16, 1981
9:00 a.m.-5:00 p.m.

Instructor: William E. Howden

Audience: Intended for software developers and software managers

Course Description: Describes systematic approaches to testing and verifying correctness of computer programs. Summarizes what is known about different techniques of software verification, and defines an approach to software in which verification is part of all phases of the life cycle.

Course Outline:
Requirements Specifications • Design Specifications • Analysis of Informal Specifications • Analysis of Source Code • Verification Analysis and Maintenance • Functional Testing • Test Coverage Metrics • Validation of Test Output • Test and Maintenance • Theory of Testing • Verification Planning • Verification Documents

William E. Howden is an associate professor of computer science at the University of California at San Diego. He has previously worked for Atomic Energy of Canada and McDonnell Douglas Astronautics and carried out extensive research projects in both the practice and theory of program testing. Mr. Howden has published papers on a wide variety of topics in program testing, and he has conducted professional seminars on software validation in the United States, Japan, Canada, and Great Britain. He received his PhD in computer science from the University of California at Irvine in 1973.

Interactive Development Environments
A. Wasserman, Lecturer
Monday, November 16, 1981
9:00 a.m.-5:00 p.m.

Instructor: Anthony I. Wasserman

Audience: Intended for software development managers, project leaders, and managers of projects involving interactive development technologies, or considering the move to such an environment.

Course Description: This tutorial presents the state-of-the-art in the use of interactive systems for software development. It proceeds from general considerations of human factors, through examination of specific tools and development environments of human factors, through examination of specific tools and development environments (UNIX and INTERLISP), to an examination of both the short and medium term future of interactive development environments.

Course Outline:
Introduction and Seminar Objectives: history of interactive systems
Ergonomic Considerations: speed • work space • visual display considerations
Design of Human/Computer Interfaces: hardware centered design • software centered design • user centered design • guidelines for user-centered design
Interactive Development Environments: concepts of systematic software development • automated support for software development • the Ada programming support environment
UNIX—An Environment for Interactive Systems: design characteristics • text processing tools • language development tools • programmer’s workbench
INTERLISP—A Language Based Environment: centralized focus of tools • do what I mean • undo

The Future of Interactive Systems: hardware advances • distributed systems • customized programs

Anthony I. Wasserman is an associate professor of Medical Information Science at the University of California, San Francisco and a lecturer in the Computer Science Division at the University of California, Berkeley. His research interests center around the development of a methodology (User Software Engineering) and an interactive development environment to support the design and construction of interactive information systems. In 1970, he received his PhD in computer sciences from the University of Wisconsin, Madison and has an A.B. in mathematics and physics from the University of California, Berkeley.
Instructor: Bill Curtis

Audience: Intended for software managers and engineers, computer science researchers, personnel administrators, human factors professionals, and anyone else interested in an overview of the psychological aspects of computer programming.

Course Description: Applies psychological theory and principles to improve software development practices. Applies principles from the models of human problem solving to explaining results obtained from empirical research on the human factors of programming language design, design of specification formats, and fault diagnosis. Presents principles from industrial/organizational psychology relevant to programmer team performance, technical management, and programmer selection.

Course Outline:

- Human Problem Solving: psychological principles derived from theoretical models of human information processing in technical areas
- Language Design: control structure design, structured programming, data typing, data organization
- Specification Formats: flowcharts, program design languages, natural languages, hierarchy charts, graphic representations
- Fault Diagnosis: characteristic human errors, fault detection strategies
- Team Performance: team organization, structured walk-throughs, goal setting, management styles
- Programmer Appraisal: selection, performance appraisal, motivation

Bill Curtis is Manager of Programming Measurements Analysis at ITT's Programming Technology Center. He is currently building a database on programming productivity and quality from ITT programming units worldwide. In addition to assessing corporate programming trends, he is assisting unit software managers in applying quantitative software models to project forecasting and problem diagnosis. Curtis received his PhD in industrial psychology and statistical methods from Texas Christian University in 1975.

Database Management in the 1980s

Instructors: James A. Larson and Harvey A. Freeman

Audience: Intended for managers, engineers, designers, database users and administrators with some experience in computing and some exposure to database or file techniques.

Course Description: This introductory level tutorial addresses the kinds of database management systems (DBMS) which will be available in the 1980's. Special emphasis will be given to DBMS interfaces available to various classes of users. Techniques available to database administrators to design both logical and physical design of data are reviewed. DBMS software architectures which support multiple data models such as the hierarchical, network and relational data models are presented. Database concepts and other hardware specially designed to accelerate database management functionality are described.

Course Outline:

- Introduction to Database Management: background, goals, trends
- Database Design Methodology: selecting information to be represented, conceptualizing and organizing information, accommodating information to a DBMS
- Tools for Database Access: programming languages, query languages, natural languages, graphical languages
- Database Management System Design: multiple schema types, multiple data models, program-data independence, design models
- Hardware Aid: approaches, database computers, commercial availability

James A. Larson, Database Management Systems Consultant for Systems and Informatics, AG, Switzerland, is currently involved in the design of integrated automated office systems for Olivetti, Italy. He is a founding member of the relational database task group of ANSI/SPARC, and has been active on the CODASYL Data Description Language Committee. Dr. Larson is the author of Database Management System Anatomy as well as numerous technical papers and articles.

Harvey A. Freeman is Vice President of Engineering at Architecture Technology Corporation, Minneapolis, Minn. Dr. Freeman was previously with Sperry Univac, where he managed a group dealing with advanced development of distributed processing networks. He is co-author of the book Data Base Computers and has published numerous technical papers.
SESSION 1: LABORATORY AND MANUFACTURING AUTOMATION (10:45 a.m.-Noon)

Chairperson: J. Staudhammer, Univ. Florida
PROMIS—A PROCESS MANAGEMENT AND INFORMATION SYSTEM FOR INTEGRATED CIRCUIT FABRICATION, H. Gomaa and J. Deboit, General Electric; and D. Scott, I.D. Sharp, Assoc.
INTERACTIVE DATA HANDLING SYSTEM FOR LABORATORY AUTOMATION, K. Hirai and E. Hashimoto, Fujitsu, Japan; and S. Koganemaru and M. Iijima, Toyota, Japan
A DATABASE FILE ALLOCATION PROBLEM, A. Liu, North Dakota St. Univ., and S. Chang, Univ. of Illinois, Chicago

SESSION 2: DATA BASE I (10:45 a.m.-Noon)

Chairperson: W.T. Hardgrave, National Bureau of Standards
ON COST ESTIMATION IN PROCESSING A QUERY IN A DISTRIBUTED DATABASE SYSTEM, W.S. Luk and P.A. Black, Simon Fraser Univ., Canada
ARCHITECTURES FOR HETEROGENEOUS DATABASE MANAGEMENT, R.H. Katz, Computer Corporation of America
AN APPROXIMATION ALGORITHM FOR THE INDEX SELECTION PROBLEM, V.V. Raghavan, M.Y.L. Ip, and L.V. Saxton, Univ. of Regina, Canada

SESSION 3: Panel
THE STATUS OF SOFTWARE SCIENCE IN 1981 (10:45 a.m.-Noon)

Chairperson: W. Curtis, ITT
SOFTWARE SCIENCE AND COGNITIVE PSYCHOLOGY, N. Coulter, Florida Atlantic Univ.
Panelists: V. Shen, Purdue Univ.; L. Ottenstein, Michigan Tech Univ.; and S. Zweben, Ohio St. Univ.

SESSION 6: Panel
HOW GOOD IS JAPANESE SOFTWARE ENGINEERING? (Part 1—1:30 p.m.-3:00 p.m.; Part 2—3:30 p.m.-5:00 p.m.)

Satellite communications hookup with Japan is planned for this session.

Chairperson: T.L. Kunii, Univ. Tokyo, Japan
Panelists: R. Kubo, Fujitsu, Japan; Y. Mizuno, NEC, Japan; H. Karatsi, Matsushita, Japan; T. Kudo, Japan Trade Center; C.V. Ramamoorthy, Univ. of California, Berkeley; P. Whiting-O'Keefe, Stanford Res. Inst.; and D. Reifer, Reifer Consultants, Inc.

SESSION 7: TEXT AND SPEECH PROCESSING (3:30 p.m.-5:00 p.m.)

Chairperson: S.K. Chang, Univ. of Illinois, Chicago
LEXICAL CHARACTERISTICS OF KEYWORDS IN HIGH LEVEL PROGRAMMING LANGUAGES, C.M. Eastman, Florida St. Univ.
PATTERN MATCHING WITH NOISY SUBSTRINGS, R.L. Kashyap and J.B. Oommen, Purdue Univ.

SESSION 8: SPECIAL TOPICS (3:30 p.m.-5:00 p.m.)

Chairperson: J. Musa, Bell Telephone Labs
MONTE CARLO METHODS FOR PIPELINE/VECTOR PROCESSORS, K.W. Bowyer, Duke Univ.
ON TESTING WITH REQUIRED ELEMENTS, S. Ntafos, Univ. of Texas, Dallas
LAYING PHANTOMS TO REST, P.A. Bernstein, Harvard Univ.

Cocktails (5:15 p.m.-7:00 p.m.)
SESSION 12: Panel
COMMUNICATIONS (10:30 a.m.-Noon)
Chairperson: T.F. Arnold, Bell Telephone Labs
Panelists: R.L. Bennett, Bell Telephone Labs; J. Manley, ITT; P.M. Cashin, Bell Northern; and A.W. Clay, GTE

Noon-1:30 p.m. Lunch

SESSION 13: Panel
ROBOT SENSING AND MODELLING (1:30 p.m.-3:00 p.m.)
Chairperson: N. Caplan, National Science Foundation
COMPUTING SURFACE SHAPE USING A THEORY OF HUMAN STEREO VISION THEORY, E. Grimson, Massachusetts Institute of Technology
ROBOTICS AND GEOMETRIC MODELLING, M.A. Wesley, IBM

SESSION 14: SOFTWARE PERFORMANCE DESIGN (1:30-3:00 p.m.)
Chairperson: B. DeWolf, Charles Stark Draper Lab
PERFORMANCE COMPARISON OF COPYLESS COROUTINE IMPLEMENTATIONS, J.P. Kearns and M.L. Soffa, Univ. of Pittsburgh
ON THE EFFICIENT GENERATION OF DYNAMIC PROGRAM FILES, L.F. Cabrera, Univ. of California, Berkeley
A METHOD FOR ESTIMATING THE EXECUTION TIME OF ARBITRARY PATHS IN A PROGRAM, S.S. Yau, M.B. Carvalho, and R.A. Nicholl, Northwestern Univ.

SESSION 15: STORAGE MANAGEMENT I (1:30 p.m.-3:00 p.m.)
Chairperson: G. Lyon, National Bureau of Standards
DISTRIBUTION-DEPENDENT DYNAMIC STORAGE ALLOCATION TECHNIQUES, L.L. Beck, San Diego St. Univ.
CONCATENATED HASH CODE SELECTION, S.K. Chang and J.C. Doring, Univ. of Illinois, Chicago
IMPROVING VIRTUAL MEMORY PERFORMANCE BY OFF-LINE PAGE CLUSTERING, J.F. Paris, Purdue Univ.

SESSION 16: Panel
CRITICAL ISSUES IN COMPUTATIONAL MEDICINE (1:30 p.m.-3:00 p.m.)
Chairperson: J.M.S. Prewitt, National Institutes of Health
Panelists: J. Aylor, Univ. of Virginia, and B. Shriver, Univ. of Southern Louisiana
THURSDAY, November 19, 1981

SESSION 19: STORAGE MANAGEMENT II (3:30 p.m. - 5:00 p.m.)
Chairperson: R. Grafton, Office of Naval Research
STORAGE STRUCTURES FOR AN ANSI SPARC DATA BASE MACHINE, S. Arora and S. Dumpala, McMaster Univ., Canada
A NEW ALGORITHM FOR CONTAINER LOADING, N. Liu and L-C. Chen, National Taiwan Univ., Taipei
LOCALITY OF REFERENCE FOR HIERARCHICAL DATABASE SYSTEMS, J. Kearns, Univ. of Pittsburgh, and S. DeFazio, Gulf

SESSION 20: BIOMEDICAL PATTERN ANALYSIS (3:30 p.m. - 5:00 p.m.)
Chairperson: E. Gose, Univ. of Illinois, Chicago
PULMONARY SCINTIGRAPHY WITH KRYPTON-81 FOR DETERMINATION OF THE TIDAL VOLUME COMPARTMENT OF RESPIRATION, T. Milo, E. Gose, W. Barnes, E. Kaplan, and A. Friedman, Univ. of Illinois, Chicago
A SYSTEM FOR DYNAMIC MULTIPLANAR RECONSTRUCTION OF TRANSVERSE SECTIONAL IMAGES, M. Nelson, Omni Medical
COMPUTERS IN RADIOLOGY, S. Dwyer, Univ. of Kansas

Cocktails (5:15 p.m. - 7:00 p.m.)

FRIDAY, November 20, 1981

SESSION 24: Panel
VLSI IMPACT ON SOFTWARE (10:30 a.m. - Noon)
Chairperson: R. DeMillo, Georgia Inst. of Technology
Panelist: L. Snyder, Purdue Univ.

SESSION 25: OPERATING SYSTEMS (1:30 p.m. - 3:00 p.m.)
Chairperson: S. Sherman, Univ. Nevada
RELIABLE SYNCHRONIZATION OF INTERACTING PROCESSORS, W.C. Yen and K.S. Fu, Purdue Univ.
MIKE: A NETWORK OPERATING SYSTEM FOR THE DISTRIBUTED DOUBLE-LOOP COMPUTER NETWORK (DDBC), M.T. Liu and D.P. Tsay, Ohio State Univ.
DEVELOPMENT OF A RELATIONAL-LIKE DATABASE MANAGEMENT SYSTEM FOR MINI/MICRO-COMPUTERS, R. Yamada, Y. Nakaæ, S. Mori, and K. Tateoka, OKI Electric Industry, Japan

SESSION 26: SOFTWARE DEVELOPMENT AIDS (1:30 p.m. - 3:00 p.m.)
Chairperson: V. Kobler, BMD Advanced Technology Center
A SPECIFICATION ANALYSIS AND DOCUMENTATION SYSTEM FOR PROCESS CONTROL SOFTWARE, Y. Matsumoto, K. Matsumura, and S. Kawakita, Toshiba, Japan
SYNTAX-DIRECTED PRETTY PRINTING — A FIRST STEP TOWARDS A SYNTAX-DIRECTED EDITOR, L.F. Rubin, Brown Univ.
PING: A TOOL FOR MAINTAINING CONFIGURABLE SOFTWARE IN PASCAL, T.A. Cargill and M.W. Herman, Univ. of Waterloo, Canada
A NEW PROGRAMMING ENVIRONMENT WITH MULTI-DISPLAY TERMINALS, K. Torii, Y. Mano, and K. Omaki Electrotechnical Lab, Japan

SESSION 27: Panel
PRODUCTIVITY TOOLS IN OFFICE AUTOMATION (1:30 p.m. - 3:00 p.m.)
Chairperson: P. Chen, Univ. of California, Los Angeles
Panelists: R. Dickinson, Burroughs; H. Mauersburg, Siemens; T. Meyers, LBC, Inc.; and F. Tung, IBM
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(1) Complete one form for each registrant. Duplicate this form if needed.

(2) Must indicate which tutorial(s) for the registration.

MONDAY NOV. 16

- "Programming Productivity: Issues for the 80s," by Jones
- "Software Verification" by Howden
- "Interactive Development Environments," by Wasserman

TUESDAY NOV. 17

- "Human Factors in Software Development," by Curtis
- "Database Management in the 1980's," by Freeman/Larson
- "Software Design Strategies," by Gordon/Bergland

NOTE:
- Requests for refunds must be received in writing no later than October 30, 1981.
- Tutorial registration fee includes luncheon and bound text of the selected tutorial.
- COMPASAC registration fee includes one copy of the conference proceedings, and two complimentary beverage tickets for each of the COMPASAC-hosted parties, Wednesday and Thursday nights.
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Limited attendance. Register early—avoid disappointment.

Registration desk will be open at the Chicago Marriott beginning Sunday evening, 4:00-7:00 p.m., November 15, 1981.

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