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THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.
This introductory level tutorial addresses the kind of database management system (DBMS) which will be available in the 1980s. Special emphasis will be given to DBMS interfaces available to various classes of users. Self-contained query languages and graphical interfaces for the end user are examined. Traditional single record-at-a-time, navigational styles and multiple record-at-a-time, high-level styles of data manipulation commands for use by high-level language programmers are contrasted. Techniques available to data base 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. Data base computers and other hardware specifically designed to accelerate database management functions are described.

**Introduction to Data Base Management**
- Background, Goals, Trends

**Data Base Design Methodology**
- Selection information to be represented
- Conceptualizing and organizing information
- Accommodating information to a DBMS

**Tools for Data Base Access**
- Programming Languages; Query Languages;
- Natural Languages; Graphical Languages

**Data Base Management System Design**
- Multiple Schema Types; Multiple Data Models;
- Program—Data Independence; Design Examples

**Hardware Aids**
- Approaches; Data Base Computers;
- Commercial availability

**LECTURERS:**
- DR. 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. Previously he was manager of Advanced Data Base Systems at Sperry Univac where he was involved in research and design of multi-model data management systems, data base computers, and distributed data processing. Dr. Larson is a founding member of the relational database task group of ANSI/SPARC. and has been active on the CODASYL Data Description Language Committee. He has also been an adjunct professor in the Computer Science Department at the University of Minnesota.

Harvey A. Freeman is Vice President of Engineering at Architecture Technology Corporation, Minneapolis, Minnesota, a consulting firm specializing in computer architecture, including local networks and office systems. Dr. Freeman was previously with Sperry Univac, where he managed a group dealing with advanced development of distributed processing systems, including local, back-end, and non-homogeneous networks. He also managed a Sperry Univac research group investigating and developing concepts, techniques and specifications for potential products in the areas of data base computers, data management, networks, electronic office, and modular computer systems.
This tutorial is intended to explore the frontiers of office automation. The tutorial develops a scenario for the office of the future. It examines current technologies being proposed for office automation and the state of the art in these technologies. The tutorial concludes with a hypothetical office system design. It attempts to structure the functions of an office in a hierarchical fashion using a medium size firm with multiple geographic locations. It assumes that each geographic location has associated with it a series of equipment interconnected using local computer networks which themselves connect via public data networks and satellite channels. The local network design and gateway interface to the public data network, satellite system and office automation equipment is examined.

Intended for managers, system analysts, programmers and other technical personnel who are interested in the future of office automation, local networks, office automation, and distributed systems.

**Introduction**
- What is office automation, purpose of office automation, market growth, approaches, product selection, evolution not revolution

**Technology**

**Hypothetical**

**LECTURER:**

**DR. KENNETH J. THURBER** is President of Architecture Technology Corporation, a consulting firm specializing in Computer Architecture, including Local Networks and Office Systems. He has presented numerous seminars at conferences such as COMP, CON, ICC, NCC, and the Distributed Processing Conference. He also taught for 7 years in the Computer Science Department of the University of Minnesota. In addition, Dr. Thurber has had 12 years of industrial experience, working with many advanced technologies. He is the editor of Office Automation Systems, the first pragmatically oriented book on this subject, and has published extensively in the field of Computer Architecture. He is also editor of the monthly LOCALNeter **Newsletter**.

This tutorial deals with improving productivity as the main problem which must be faced by American businesses, industry and government during the 1980s. A failure to make substantial productivity gains over the next few years would be at the very least national disgrace. It could be a national disaster.

In the years to come it will be ever more widely recognized that the real problem is not on our assembly lines or with our clerical forces. It is at the management/administrative/senior knowledge worker level. That is what we call "white collar." And improving white collar productivity is what this tutorial is all about.

The ideas, recommendations and conclusions which are discussed are based upon the work done in improving productivity. It is consistent with and solidly based upon a systematic approach to the knowledge worker (white collar) productivity problem that is continuing to develop both in theory and in on-going work on real problems.

The tutorial, the knowledge worker productivity plans which it discusses and the management control system which makes it possible to implement the plans jointly reflect the key idea that the work necessary to accomplish a specific goal must be carefully defined and simply connected to the organization which is to do the work. The process of defining work structures (which properly reflect goal structures) in such a way that they can be effectively carried out by an organization is iterative, continuing and non-trivial. The process will be examined in the tutorial. It will be illustrated by examples from real problems which have been solved during the course of this tutorial.

**LECTURER:**

**LON GRACE** has spent nearly 20 years in management positions with General Dynamics, RCA and the Travelers Insurance Companies. Earlier, he had been a member of the faculty at Trinity College where he is currently Adjunct Professor of Computer and Information Science.

His assignments have ranged from technical leadership on small projects, through computer center management, to the line responsibility for several hundred professional people geographically dispersed and engaged in the design and development of software for the entire RCA computer product line. During these years he first became aware of productivity problems in organizations composed largely of highly capable people. His control systems emerged from this experience.

Mr. Grace holds degrees from Trinity and Yale. He is a Fellow of the British Computer Society and a member of a number of other professional and honorary organizations, including Phi Beta Kappa. He is a past National Lecturer for the Association of Computing Machinery and has been active in various national and international technical, standards and management bodies all of his professional life. He is listed in Who's Who in the East and other directories.

The purpose of this tutorial is to introduce to practitioners advanced concepts and techniques for designing the software components of complex systems. Within the constraints of time, the objective is to provide the attendees sufficient introduction to modern software design techniques to permit them to create a demonstrably better design on their next project.

There are a number of general principles of good design that apply to several stages of software system development. These principles are identified and explained first. Then specific methods that support these concepts are presented.

The tutorial will go into some depth in describing structured design because it serves as a good model for a variety of design situations. Recent advances that couple data and functional design will be presented.

In the detailed design area, several techniques and principles will be explained. Included among these are the Jackson design method, Logical Construction of Programs, step-wise refinement, and use of program design languages.

The tutorial also stresses the application of quality and complexity measures as ways of improving both the technical quality and the managerial aspects of software design.

**Instructional Objectives (Targets):** After the tutorial, the attendee will:
1. Understand the difference between design and programming;
2. Be able to explain and illustrate the importance of structure in design;
3. Be able to explain the importance of principles of modularity and abstraction;
4. Understand the importance of joint data and functional design and know the current thinking on how to achieve it;
5. Understand the basic concepts and current practice in major design methods including structured design, LCP, Jackson design, and Parnas' techniques;
6. Be able to apply simple design quality measures.

**LECTURER:**

**PETER FREEMAN** is an associate professor of information and computer science at the University of California, Irvine. He has been involved in the analysis, design, and construction of advanced computer applications and the training of software engineers since 1961. Freeman's research activities have been concentrated in software design techniques and their application to the software engineering process.

Freeman has published numerous technical papers and is the author of SOFTWARE SYSTEMS PRINCIPLES (SRA, 1975). In addition, he has jointly edited (with Prof. Wasserman) two books: SOFTWARE ENGINEERING EDUCATION (Springer-Verlag) and SOFTWARE DESIGN TECHNIQUES (IEEE Computer Society, 1980). He received his PhD in computer science from Carnegie-Mellon University in 1970.
TUESDAY, September 15, 1981

9:00 A.M.
PLENARY SESSION

10:00 A.M.
Keynote Session
Harlan Mills, Chairperson

Keynoter: Richard de Lauer,
Department of Defense

COFFEE BREAK — 11:00-11:30 A.M.

11:30 A.M.-12:30 P.M.

1. INVITED SPEAKER
BARRY BOEHM, TRW/DSSG
Chairperson: Y. Ohno, Univ. of Kyoto

2. INVITED SPEAKER
JAMES ALBUS, Natl. Bureau of Standards
Chairperson: V. Basili, Univ. of Maryland

3. INVITED SPEAKER
C.V. RAMAMOORTHY, Univ. of California
Chairperson: R. Yeh, Univ. of Maryland

LUNCH — 12:30 P.M.-2:00 P.M.

2:00-3:30 P.M.

4. HUMAN FACTORS
Chairperson: Y. Chu, Univ. of Maryland
HUMAN PRODUCTIVITY IN SOFTWARE DEVELOPMENT
R.C. Linger, IBM
MATCHING SOFTWARE TOOLS TO ORGANIZATIONS USING MATURITY FACTORS —
J. Matejceck, Dept. of Commerce,
M. Weiser, Univ. of MD
DISCUSSANT: J. Gannon, Univ. of Maryland

5. QUALITY ASSURANCE I
Chairperson: F. Kamijo, IIPA
ALLOCATION OF RESOURCES FOR SOFTWARE RELIABILITY
H. Hecht, SoHaR, Inc.
STEPS: INTEGRATED SOFTWARE STANDARDS AND ITS PRODUCTIVITY IMPACT —
M. Azuma, Y. Mizuno, Nippon
DISCUSSANT: J. Musa, Bell Labs

6. EXPERIENCE WITH TOOLS
Chairperson: TBD
EXPERIENCES WITH A CODE GENERATION TOOL
R. Noonan, Coll. Wm. & Mary
PRODUCTIVITY EXPERIENCES WITH A SCENARIO TOOL
R.E.A. Mason, T.T. Carey, Univ. of Guelph
DISCUSSANT: M. Zelkowitz, Univ. of Maryland

COFFEE BREAK — 3:30-4:00 P.M.

4:00 P.M.-5:30 P.M.

7. SOFTWARE PRODUCTIVITY MEASUREMENT PANEL
Chairperson: B. Curtis, ITT
DISCUSSANT: S. Fuller, DEC.

8. HUMAN FACTORS PANEL
Chairperson: B. Shneidman, Univ. of MD
DISCUSSANT: E. Sibley, Alpha Omega Group, Inc.

9. EDUCATION PANEL
Chairperson: C. Coates, Purdue Univ.
DISCUSSANT: H. Mills, IBM
WEDNESDAY, September 16, 1981
9:00 A.M.-10:00 A.M.

Keynote: Koji Kobayashi, Nippon Electric Co.

COFFEE BREAK — 10:00 A.M.-10:30 A.M.

10. SOFTWARE MODELS
Chairperson: I. Miyamoto, Univ. of MD
APPLICATION OF THE RAYLEIGH MODEL TO THREE DIFFERENT TYPES OF SOFTWARE PROJECTS
W.K. Wiener-Ehrlich, J. Hamrick, V. Rupolo, Bankers Trust Co.
The IMPLICATIONS OF PROGRAM COMPOSITION AND SIZE ON DEVELOPMENT PRODUCTIVITY
L. Paulsen, IBM
AN APPROXIMATE QUEUEING NETWORK MODEL OF A SHARED DEVICE AMONG INDEPENDENT COMPUTING SYSTEMS
A. Mink, NBS, C. Silio, Univ. of MD
DISCUSSANT: M. Lehman, Imperial College

11. HARDWARE DESIGN
Chairperson: H. Cragon, Texas Instruments
DESIGN METHODOLOGY FOR TESTABLE VLSI
C. Chen, Sperry Unisys
A MASK ARTWORK ANALYSIS SYSTEM FOR BIPOLAR INTEGRATED CIRCUITS
MEASURING CAD PRODUCTIVITY
D. Borda, Arthur D. Little Inc.
DISCUSSANT: D. Kuck, Univ. Ill.-Urbana-Champaign

12. DATABASE STANDARDS PANEL
Chairperson: E.H. Sibley, Alpha Omega Group, Inc.

LUNCH — 12:30 P.M.-2:00 P.M.

2:00-3:30 P.M.

13. QUALITY ASSURANCE II
Chairperson: Y. Mizuno, Nippon
A STRUCTURED FUNCTIONAL TESTING APPROACH GENERIC DATA STRUCTURE + TEST ALGORITHM = TEST PROGRAM
C. Lin, NCR
THE ROLE OF STRATEGIC PLANNING FOR PRODUCTIVITY IMPROVEMENT THROUGH COMPUTER-AIDED ENGINEERING
L. Lipchin, Nolan, Norton & Co.
DISCUSSANT: A. Goel, Syracuse Univ.

14. TOOL EVALUATION
Chairperson: C. Vick, Systems Control, Inc.
EARLY EXPERIENCE WITH MONSTR: A SOFTWARE MAINTENANCE
K. Knobe, Mass. Computer Assoc., Inc.
COBOL MACHINE EVALUATION
DISCUSSANT: W. Riddle, Cray Labs

15. EVOLUTION DEVELOPMENT
Chairperson: L. Belady, IBM/T.J. Watson Research Center
EVOLUTIONARY CYCLIC MODEL FOR DEVELOPMENT OF COMPLEX SOFTWARE SYSTEMS
R. Friefmelt, Karlshruhe Institut
PRODUCTIVITY ACROSS THE SOFTWARE LIFE CYCLE
M. Lehman, Imperial College

COFFEE BREAK — 3:30 P.M.-4:00 P.M.

4:00 P.M.-5:30 P.M.

16. SOFTWARE MANAGEMENT PRODUCTIVITY PANEL
Chairperson: E. Goldberg, TRW
DISCUSSANT: J. Manley, ITT

17. OFFICE AUTOMATION PANEL
DISCUSSANT: V. Lum, IBM

18. ICAM PANEL
Chairperson: R. Mayer, AFWAL/MLTC
DISCUSSANT: L. Stucki, Boeing Computer Services

COCKTAIL PARTY — 6:00 P.M.-7:30 P.M.
COFFEE BREAK — 10:00 A.M.-10:30 A.M.

10:30 A.M.-12:30 P.M.

19. SOFTWARE DEVELOPMENT PROCESS
Chairperson: TBD
APPLYING INDUSTRIAL ENGINEERING TO THE SOFTWARE DEVELOPMENT PROCESS
W.W. Agresti, Univ. of Michigan
UNIFYING DATA FLOW & CONTROL FLOW BASED MODULARIZATION TECHNIQUES
K. Iwamoto, O. Shigo, Nippon Electric
SPECIFICATION VERSUS IMPLEMENTATION
D. Ridianovic, M.L. Brodie, Univ. MD
DISCUSSANT: D. Parnas, IBM

20. SOFTWARE DESIGN
Chairperson: C.V. Ramamoorthy, Univ. Calif.
DOCUMENTATION TECHNOLOGY FOR PACKING HIERARCHICAL FUNCTION, DATA, AND CONTROL STRUCTURES
S. Hanata, T. Satoh, M. Inada, Yokosuka Electrical Commun. Laboratory
AN INTERACTIVE TOOL FOR NARRATIVE, OPERATIONAL AND STRUCTURAL DOCUMENTATION
P.N. Robillard, Ecole Polytechnique, Montreal
A SUCCESSFUL APPROACH TO MANAGING, DEVELOPING, AND MAINTAINING SOFTWARE
DISCUSSANT: G. Parikh, Shetal Enterprises

21. DOD'S SOFTWARE TECHNOLOGY INITIATIVE
Chairperson: J. Batz, Dept. of Defense

LUNCH — 12:30 P.M.-2:00 P.M.

2:00 P.M.-3:30 P.M.

22. SOFTWARE PRODUCTIVITY TOOLS AND TECHNIQUES PANEL
Chairpersons: C. Davis, U.S. Army
P. Mauro, TRW
DISCUSSANT: D. Gries, Cornell Univ.

23. SOFTWARE PRODUCT QUALITY PANEL
Chairperson: Y. Mizuno, Nippon Electric

24. SOFTWARE PRODUCTIVITY VIA HARDWARE ARCHITECTURE
Chairperson: Y. Patt, Univ. of Calif.
DISCUSSANT: Y. Chu, Univ. of MD

COFFEE BREAK — 3:30 P.M.-4:00 P.M.

4:00 P.M.-5:30 P.M.

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