Lecture Notes in Computer Science 720

Vladimír Mařík Jiří Lažanský
Roland R. Wagner (Eds.)

Database and Expert Systems Applications

4th International Conference, DEXA '93
Prague, Czech Republic, September 1993
Proceedings

DEXA 93

Springer-Verlag

Vladimír Mařík Jiří Lažanský
Roland R. Wagner (Eds.)

Database and Expert Systems Applications

4th International Conference, DEXA '93
Prague, Czech Republic, September 6-8, 1993
Proceedings

DEXA 93
江苏工业学院图书馆
藏书章

Springer-Verlag
Berlin Heidelberg New York
London Paris Tokyo
Hong Kong Barcelona
Budapest

Series Editors

Gerhard Goos
Universität Karlsruhe
Postfach 69 80
Vincenz-Priessnitz-Straße 1
D-76131 Karlsruhe, Germany

Juris Hartmanis
Cornell University
Department of Computer Science
4130 Upson Hall
Ithaca, NY 14853, USA

Volume Editors

Vladimír Mařík
Jiří Lažanský
Faculty of Electrical Engineering, Czech Technical University
Technicka 2, 16 627 Prague, Czech Republic

Roland R. Wagner
Inst. for Informatics & Research Inst. for Applied Knowledge Processing (FAW)
J. Kepler University Linz
Altenbergerstraße 69, A-4040 Linz, Austria

CR Subject Classification (1991): H.2, H.4, H.5.2, I.2.1, I.2.4-5

ISBN 3-540-57234-1 Springer-Verlag Berlin Heidelberg New York
ISBN 0-387-57234-1 Springer-Verlag New York Berlin Heidelberg

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

© Springer-Verlag Berlin Heidelberg 1993
Printed in Germany

Typesetting: Camera-ready by author
Printing and binding: Druckhaus Beltz, Hemsbach/Bergstr.
45/3140-543210 - Printed on acid-free paper

Foreword

The Database and Expert Systems Applications (DEXA) Conferences are traditionally thought as a wide platform for the exchange of ideas, experience and opinions among theoreticians and practitioners active in the areas of database and artificial intelligence technologies and coming from all over the world.

Despite the applications aspect occurring in the name of the conference, the Program Committee arranged – as it has become tradition – the necessary balance between theoretical and practical points of view.

This volume contains the best 78 contributed papers which have been carefully selected during a tight reviewing process involving comments of many international experts by the Program Committee from a total of 269 submissions. The scope of the papers in this proceedings covers the real hot topics in both the areas of database and AI systems. The database sessions are primarily devoted to *object-oriented data modeling*, *distributed databases*, *active database aspects*, *database optimization*, and *performance evaluation*; among the specialized systems *spatial* and *geographic databases* have been stressed. Artificial Intelligence is represented in particular by papers on *expert systems applications*, *knowledge engineering* and *distributed AI systems*. While some of the topics, as for example *hypertext/hypermedia* and *user interfaces*, are important for both database and AI systems, some fields, in particular *software engineering* and *legal systems*, are even aimed at integrating the results achieved in both fields.

DEXA'93 is the 4th conference in the line and has some new features. After Vienna (1990), Berlin (1991), and Valencia (1992), this conference takes place in the capital of an East-European country, thus providing an ideal forum for the advancement of the East-West scientific cooperation.

This conference is the first organized in cooperation with the IEEE Computer Society; this is an important feature confirming that the DEXA Conferences have gained a certain recognition among many international database and AI events. All the individuals involved in the preparation of this conference consider this fact as a great honour.

We would like to express our thanks to all institutions actively supporting this event, namely to

Research Institute for Applied Knowledge Processing (FAW), Linz
Czech Technical University, Prague
IEEE Computer Society
Allen-Bradley, A Rockwell Int. Comp., Milwaukee, WI.
Austrian Computer Society (ÖCG)
Gesellschaft für Informatik (GI)

Our thanks are also due to all individuals who took an active part in the dissemination of information and in the encouragement of many potential contributors. In this respect, the activities of the following people are highly appreciated: P. Dražan (The Netherlands), A. Hameurlain (France), F. Golshani

(U.S.A.), T. W. Ling (Singapore), J. Debenham (Australia), F. Galindo (Spain), D. Karagiannis (Germany), B. Pernici (Italy), E. Lum (Hong Kong), and J. Wand (Canada).

We also would express our thanks to all members of the Program Committee and the Organizing Committee as well as to all referees supporting the selection of the contributions with valuable evaluations often given on short notice.

Vienna, Prague, Linz
June 1993

A Min Tjoa
V. Mařík
J. Lažanský
R. R. Wagner

General Chair

A Min Tjoa	University of Vienna, Austria

Program Committee Chair

Vladimír Mařík	Czech Technical University, Czech Republic

Organizing Committee Chair

Roland R. Wagner	J. Kepler University, Austria

Program Committee

Afsarmanesh H.	University of Amsterdam, The Netherlands
Appelrath H. J.	University of Oldenburg, Germany
Bauknecht K.	University of Zürich, Switzerland
Bench-Capon T.	University of Liverpool, United Kingdom
Bing J.	NRCCL Oslo, Norway
Bratko I.	University of Ljubljana, Slovenia
Croft B.	University of Massachusetts, USA
Cellary, W. S.	Technical University of Poznan, Poland
Debenham J.	University of Technology, Sydney, Australia
Dražan P.	RIKS Maastricht, The Netherlands
Eder J.	University of Klagenfurt, Austria
Furtado A. L.	University of Rio de Janeiro, Brazil
Galindo F.	University of Zaragoza, Spain
Gardarin G.	INRIA, France
Golshani F.	Arizona State University, USA
Gottlob G.	Technical University of Vienna, Austria

此为试读,需要完整PDF请访问: www.ertongbook.com

Hajičová E.	Charles University, Czech Republic
Hawryszkiewycz I.	University of Technology, Sydney, Australia
Henderson P.	University of Southampton, United Kingdom
Hirota K.	Hosei University, Japan
Hong J.-K.	IBM Tokyo, Japan
Hsiao D.	Naval Postgraduate School, USA
Jarke M.	University of Aachen, Germany
Kamel M.	Naval Postgraduate School, USA
Kambayashi Y.	IMEEI, Japan
Kappel G.	University of Vienna, Austria
Karagiannis D.	University of Vienna, Austria
Kroha P.	University of Dortmund, Germany
Lažanský J.	Czech Technical University, Czech Republic
Lochovsky F.	HKUST, Hong Kong
Lum V.	Chinese University of Hong Kong, Hong Kong
Müller G.	University of Freiburg, Germany
Motiwalla J.	University of Singapore, Singapore
Neimat M.-A.	HP Laboratories, USA
Neuhold E.	GMD-IPSI, Germany
Olive A.	Universitat Politecnica de Catalunya, Spain
Ozsoyoglu G.	University Case Western Research, USA
Papazoglou M.	National University, Australia
Quirchmayr G.	J. Kepler University, Linz, Austria
Ramos I.	Technical University of Valencia, Spain
Rolland C.	University Paris I, France
Rollinger C.-R.	University of Osnabrück, Germany
Roussopoulos N.	University of Maryland, USA
Saltor F.	Facultat d'Informatica, Spain
Sernandas A.	University of Lisbon, Portugal
Smith J. C.	University of British Columbia, Canada
Specht D.	Produktionstechnisches Zentrum Berlin, Germany
Štěpánková O.	Czech Technical University, Czech Republic
Tanaka K.	Kobe University, Japan
Thanos C.	IEI-CNR, Italy
Thoma C. H.	Ciba-Geigy, Switzerland
Van Dorsser C.	ORIGIN, The Netherlands
Vidyasankar K.	Memorial University of Newfoundland, Canada
Wagner R. R.	J. Kepler University, Linz, Austria

Organizing Committee:

Wagner G.	J. Kepler University, Linz, Austria
Kouba Z.	Czech Technical University, Prague, Czech Republic
Lhotská L.	Czech Technical University, Prague, Czech Republic
Přeučil L.	Czech Technical University, Prague, Czech Republic
Vlček T.	Czech Technical University, Prague, Czech Republic

List of Referees

Each paper was carefully reviewed by three referees. Most of this work was done by the Program Committee. However, invaluable help was provided by other referees listed below:

Aberer K.
Adelsberger H.
Amano H.
Arikawa M.
Bayle A.
Berka P.
Bradbury W.
Brayshaw M.
Brázdil P.
Búcha J.
Castellanos M.
Cortes-Rello E.
Csonto J.
Demlová M.
Dorffner G.
Drobnič M.
Emmerich W.
Falby J.
Findler N.
Fischer G.
Friedrich G.
Garcia-Solaco M.
Grobelnik M.
Hájek P.
Halaška I.
Hameurlain A.
Harmanec D.
Hlaváč V.
Horáček P.
Hori M.
Hořejš J.
Hudec B.
Jirků P.
Junkermann G.
Kanet J.
Klas W.
Klir G.
Kobe U.
Kotek Z.
Kouba Z.
Král J.
Kramosil I.
Kraus K.
Kroha P.
Kunishima T.
Kusaku K.
Kwak S.
Lee J.
Leung K.S.
Lhotská L.
Löhr N.
Macháček M.
Maruyama H.
Matoušek V.
Mayorga I.
Mladenić D.
Motta E.
Mozetic I.
Muth P.
Nakamura Y.
Pastor J.A.
Pizzarello A.
Plášil F.
Pokorný J.
Polák J.
Popper M.
Price B.
Pröll B.
Psutka J.
Přeučil L.
Qianshan H.
Retschitzegger W.
Rausch-Schott S.
Rodriguez H.
Röhner F.
Roos N.
Schutzelaars A.
Starzacher P.
Stumptner P.
Šonka M.
Štěpánek P.
Takahashi J.
Takeda K.
Traunmüller R.
Ulje I.
Urbančič T.
Ushakov I.
Van d. Baaren J.
Vlček T.
Watt S.
Winkelhofer A.
Wolfmayr K.
Wu X.
Yoshida N.
Zdráhal Z.
Zheng Y.

Table of Contents

Invited Talk

Information Handling - A Challenge for Databases and Expert Systems
BUSSE R., MÜLLER A., NEUHOLD E.J. 1

Topic 1: Data Models

Context Versions in an Object-Oriented Model
AL-JADIR L., FALQUET G., LÉONARD M. 24

Towards Class-less Object Models for Engineering Design Applications
GROSS-HARDT M., VOSSEN G. 36

Semantic Relativism in Conceptual Modelling
POKORNÝ J. 48

Animation Support for a Conceptual Modelling Language
HARTMANN T., JUNGCLAUS R., SAAKE G. 56

A Unifying Model of Data, Metadata and Context
DUONG T., HILLER J., SRINIVASAN U. 68

Topic 2: Distributed Databases

Information Brokers: Sharing Knowledge in a Heterogeneous Distributed System
BARBARÁ D., CLIFTON CH. 80

A Customized Multidatabase Transaction Management Strategy
CHEN J., BUKHRES O.A., SHARIF-ASKARY J. 92

Interoperability between a Distributed System and a Database System
DANES A., EXERTIER F., HAJ HOUSSAIN S. 104

Reservation Commitment and Its Use in Multidatabase Systems
MULLEN J.G., JING J., SHARIF-ASKARY J. 116

Predict Query Processing Cost in a Distributed Database System
MENG W., LIU CH., SUN W., YU C. 122

CoBase: A Cooperative Query Answering Facility for Database Systems
CHU W.W. 134

Duplicate Deletion in a Ring Connected, Shared-Nothing, Parallel Database System
ABDELGUERFI M., GRANT K., MURPHY E., PATTERSON W. 146

Topic 3: Advanced Database Aspects

On Temporal-fuzziness in Temporal Fuzzy Databases
KURUTACH W., FRANKLIN J. 154

Object-based Schema Integration for Heterogeneous Databases: A Logical Approach
SPRINGSTEEL F.N. 166

Heterogeneous Multilevel Transaction Management with Multiple Subtransactions
VEIJALAINEN J. 181

Inheritance Conflicts in Object-Oriented Systems
LING T.W., TEO P.K. 189

Managing Derived Data in Intelligent Database Systems: An Implementation Study
ZHAO J.L. 201

An Integrated Calculation Model for Discovering Functional Relations from Databases
ZHONG N., OHSUGA S. 213

On the Maintenance of Implication Integrity Constraints
ISHAKBEYOGLU N.S., ÖZSOYOGLU Z.M. 221

REFLEX Active Database Model: Application of Petri-Nets
NAQVI W., IBRAHIM M.T. 233

Road Accident Analysis Using a Functional Database Language
WU J., HARBIRD L. 241

Topic 4: Database Optimization and Performance Evaluation

Database Performance Evaluation: a Methodological Approach
REVELL N., YOUSSEF M.W. 253

Design and Implementation of a DBMS Performance Assessment Tool
KERSTEN M.L., KWAKKEL F. 265

Modifying Database Queries and Error Constraints
DU K., OZSOYOGLU G. 277

Performance Evalution System for Object Stores
RABITTI F., SFERRAZZA R.S., TORI M.G., ZEZULA P. 289

An Optimization Method of Data Communication and Control for Parallel Execution of SQL Queries
HAMEURLAIN A., MORVAN F. 301

Developing a Database System for Time-Critical Applications
SON S.H., GEORGE D.W., KIM Y.-K. 313

Object-Oriented Querrying of Existing Relational Databases
KEIM D.A., KRIEGEL H.-P., MIETHSAM A. 325

Topic 5: Spatial and Geographical Databases

A Probabilistic Spatial Data Model
KORNATZKY Y., SHIMONY S.E. 337

Query Processing of Geometric Objects with Free Form Boundaries in Spatial Databases
KRIEGEL H.-P., HEEP S., FAHLDIEK A., MYSLIWITZ N. 349

Brain Data Base (BDB)
ANOGIANAKIS G., KROTOPOULOU A., SPIRAKIS P., TERPOU D., TSAKALIDIS A. 361

Integrating Classes and Relations to Model and Query Geographical Databases
GARDARIN G. 365

Towards Cooperativeness in Geographic Databases
HEMERLY A.S., FURTADO A.L., CASANOVA M.A. 373

GeO_2: Object-Oriented Contribution for a Geographical DBMS ?
DAVID B., RAYNAL L., SCHORTER G. 377

Topic 6: Expert Systems and Knowledge Engineering

GemCode: An Expert System Generating Mnemonic Codes for Data Elements and Data Items
SONG I.-Y., GODSEY H.M., NEWTON J., BARGMEYER B. 384

ALEXSYS - A Prototype Knowledge Based Expert System for the Quality Assurance of High Pressure Die Castings
WEBSTER C.A.G., WELLER M., SFANTSIKOPOULOS M.M., TSOUKALAS V.D. 396

Viewpoints - Facilitating Expert Systems for Multiple Users
FINCH I. 401

Improving Shafer-Logan's Algorithm for Handling Hierarchical Evidence
GUAN J.W., BELL D.A. 413

From Low-Level to High-Level Operations in Expert Systems
POPPER M. 424

Corpora as Expert Knowledge Domains: the Oxford Advanced Learner's Dictionary
WILSON E. 428

Maintenance of Knowledge Bases
LEHNER F., HOFMANN H.F., SETZER R., MAIER R. 436

Using Candidate Space Structure to Propose the Next Measurement in Model Based Diagnosis
ZDRÁHAL Z. 448

Decomposition of Four Component Items
DEBENHAM J. 457

Intelligent Inference for Debugging Concurrent Systems
BRAYSHAW M. 461

Sharing Temporal Knowledge by Multiple Agents
BOTTI V., BARBER F., CRESPO A., GALLARDO D., RIPOLL I., ONAINDÍA E., HERNÁNDEZ L. 470

Querying and Exploring Large Knowledge Bases
HUNG H.-K., MARTIN P., GLASGOW J., WALMSLEY Ch., JENKINS M. 474

Managing Text Objectively
WATT S. 478

此为试读,需要完整PDF请访问: www.ertongbook.com

Topic 7: Legal Systems

Legal Expert System KONTERM - Automatic Representation of Document Structure and Contents
SCHWEIGHOFER E., WINIWARTER W. 486

Matrim, Man Expert System on Marital Law
MUNOZ J.F., GALINDO F. 498

Contradiction and Confirmation
POULIN D., ST-VINCENT P., BRATLEY P. 502

Meta-Reasoning in Law: A Computational Model
TISCORNIA D. 514

The Application of Kripke-Type Structures to Regional Development Programs
BAAZ M., GALINDO F., QUIRCHMAYR G., VÁZQEZ M. 523

Topic 8: Other Database and AI Applications

Data Management Tools for Genomic Applications: A Progress Report
MARKOWITZ V.M., CHEN I.-M.A. 529

Resolution of Constraint Inconsistency with the Aim to Provide Support in Anaesthesia
ROTTERDAM E., VAN DENNEHEUVEL S., HENNIS P.,VAN EMDE BOAS P. .. 541

An Object-Oriented Implementation for a Semantic System (CANDID)
TOURE F., SCHNEIDER M. 553

Distributed Schema Management in a Cooperation Network of Autonomous Agents
AFSARMANESH H., TUIJNMAN F., WIEDIJK M., HERTZBERGER L.O. 565

A Distributed AI System for Job Shop Control
DILGER W., KASSEL S. 577

Expert System for Production Planning of Perishable Goods
GOSPODAROWICZ A., KANIA E., KRAWCZYK S., RYMARCZYK M., TJOA A M. 583

An Expert System as a Manager in the Application of Production Planning and Control Software in CIM Environments
MEKRAS N.D., MALAMA A.G., PARNASSAS G.P., TATSIOPOULOS I.P. 593

Composition and Dependency Relationships in Production Information System Design
DJERABA C., HSSAIN A.A., DESCOTES-GENON B. 605

Vehicle Transactions
TAKIZAWA M., HAMADA S., DEEN S.M. 611

An Approach to Image Retrieval for Image Databases
GEVERS T., SMEULDERS A.W.M. 615

Facilitatory Process for Contrast Detection
CANDELA S., GARCÍA C., MUNOZ J., ALAYON F. 627

Topic 9: Software Engineering

Object-Oriented Database Management Systems for Construction of CASE Environments
EMMERICH W., KROHA P., SCHÄFER W. 631

Summary Data Representations in Application Developments
HWANG T.-L. 643

Reusable Process Chunks
ROLLAND C., PRAKASH N. 655

From Analysis to Design in a Deductive and Object-Oriented Environment
LÓPEZ O.P., RAMOS I., CANÓS J.H. 667

A Case Study for an Open CASE System: The TROLL *light* Development Environment
VLACHANTONIS N. 673

Meta Data Model for Database Design
WELZER T., EDER J. 677

Extending PCTE with Object-Oriented Capabilities
WU X., NEUHAUS J. 681

Topic 10: Hypertext/Hypermedia and User Interfaces

A New Hypermedia Data Model
MAURER H., SCHERBAKOV N., SRINIVASAN P. 685

Linearisation Schemata for Hypertext
BENCH-CAPON T.J.M., DUNNE P.E.S., STANIFORD G. 697

HyperPATH/O_2: Integrating Hypermedia Systems with Object-Oriented Database Systems
AMANN B., CHRISTOPHIDES V., SCHOLL M. 709

Integrating Knowledge-based Hypertext and Database for Task-oriented Access to Documents
NANARD J., NANARD M., MASSOTTE A.-M., DJEMAA A., JOUBERT A., BETAILLE H., CHAUCHÉ J. 721

Reengineering of User Interfaces for the Migration of Database Applications
KARAGIANNIS D., ORTWEIN E., GAG J. 733

User Interface of Knowledge Based-DSS Development Environment
KLEIN M.R., TRAUNMÜLLER R. 746

A Highly-Customisable Schema Meta-Visualisation System for Object-Oriented (O-O) Database Schemas - Overview
QUTAISHAT M.A., GRAY W.A., FIDDIAN N.J. 756

Walkthrough Using Animation Database System MOVE
KUROKI S., KIKKAWA K., KANEKO K., MAKINOUCHI A. 760

Author Index 766

Information Handling – A Challenge for Databases and Expert Systems

Ralph Busse, Adrian Müller, Erich J. Neuhold

GMD–IPSI
Dolivostr. 15, D–64293 Darmstadt, FRG
e–mail: {busse,amueller,neuhold}@darmstadt.gmd.de

Abstract The increasing availability of a broad range of information types like textual documents, audio and video data, and hyper-linked information structures imply a need to reformulate the task of information handling systems. An integrated heterogeneous information pool of interlinked multimedia data forms the center of such a system. In order to create and utilize this pool components involving many interoperating humans and also active (intelligent) system support are needed. In this paper we focus on the acquisition, offer, and retrieval of information performed around this pool of multimedia data. We discuss requirements, approaches and (partial) solutions in areas like storage, information modelling, semi-automatic acquisition, retrieval and visualization of multimedia data, and sketch implemented systems that integrate some of these aspects. The discussions will identify needs and show techniques to embed expert system functionality into each single step of the process of information handling. An integrated prototype, which is currently under development at GMD-IPSI, will be outlined at the end of this paper.

1 Introduction

In former times, the materialization of verbal knowledge in books, and then the creation of public libraries, started new eras in information handling and in interhuman communication. Nowadays, knowledge is more and more stored in electronic libraries and made available through information servers in networks. The necessity of being 'up to date' and the immense growth of electronic information require on-line access to the data. Furthermore, the central storage of information and its replicability create new means of information delivery. Broadcasting through a network is the fastest way to provide many people with actual information. This requires adequate representation of all potential information. Not only size and structure of the data items increase. New media like video or audio, for example, provide a new quality of stored data, because they add temporal aspects to all tasks that are performed around a database.

Taking all these demands into account, the challenges to database development can be sketched as:

- appropriate modelling of multimedia data
- effective storage and retrieval of mass data
- synchronization and real-time assertions for temporal data
- automatic acquisition of external data

- unified modelling layer for a simple access to all kinds of data
- integration of network services into information management systems

All these new requirements go beyond the capabilities of traditional database management systems. Most of the tasks are already solved, as long as they are viewed separately. E.g., CAD/CAM applications and desktop publishing programs are publicly available. But the integration of all these requirements into a new database concept remains to be done. The object-oriented paradigm of database design seems to be a good basis for this integration. Thus, the major goal of database development can be summarized as:

Databases must efficiently store all kinds of data and provide integrated and unified manipulation methods.

Traditional retrieval systems are designed for effectiveness in searching and finding single records or simple sets of data in large but poorly structured databases. This becomes obvious if one takes a closer look at the quality measures that have been formulated several decades ago and are still in use. *Recall* (the ratio of relevant documents retrieved) and *precision* (the degree of 'noise' in the result set) are purely quantitative rules of success.

The new and promising results in information acquisition and storage imply a need to develop new paradigms for the design and construction of intelligent multimedia information systems. New challenges for information handling systems – to provide access to complex information structures and to support users in preparation of large and rich structured data – have to be adopted in two domains. On the one hand there is a need to build new kinds of general purpose retrieval tools. On the other hand existing applications have to incorporate novel information structures without loosing their acquainted usage. These future systems have to address more qualitative goals like:

- mediation of dependencies of information, not leaving users alone in 'hyperspace',
- visualization of complex information structures and
- integration of several types of media within one unique metaphor of man-machine interaction.

New theories and technologies that have been developed in the area of information retrieval to reach these design goals should be transferred to existing applications in the domain of databases and information systems (e.g. business and engineering systems, bulletin boards, library systems, or electronic newspapers). These systems should be endowed with components capable to handle new electronic media like video, audio, interactive maps and pictures to overcome the existing paradigm of pure information managing. This integration leads to promising approaches like

- presenting data as instantiations of concepts and ideas, i.e., cooperation of users and machines via active media and
- intensifying the productivity of the human mind (by abstracting from physical or spatial aspects of information storage and retrieval and offering cognitive models of the underlying information sources)

The formulation of clear and procedural design guidelines for information handling systems and the development of active multimedia systems in the way sketched here is a

long-range goal. Research at GMD–IPSI and other locations has started to tackle certain aspects. The overall goal is the development of fully functional prototypes which can mutually be combined to integrate the benefits of distinct research areas.

The big amount of automatic processing and the high degree of user interaction reveal a big need of integrating techniques from the area of knowledge processing to allow information handling systems to take decisions and to guide the user in his or her tasks. Instead of providing stand-alone expert systems, active system support is achieved by embedding knowledge based assistance components into the system.

In the following we will take a look at different aspects of information handling. Section 2 presents an overview of the whole 'process of information handling'. The single steps in the information flow from information sources to terminal applications are depicted and related to each other. Section 3 sheds some light on information acquisition and storage mechanisms appearing in that environment. Structural enrichment, schema integration and concepts for modelling videos are the selected topics. New developments in retrieval techniques are presented in section 4. Multimodal dialogues and interface mechanisms to heterogeneous databases lead up to virtual-reality visualizations of complex data. The last section of this paper will then be used to present the MultiMedia Forum, an integrated information system prototype under development at GMD–IPSI.

2 The Process of Information Handling

The main functionality of an information handling system is the acquisition and maintenance of data together with a support of appropriate retrieval mechanisms. This overall scope can be divided into two general parts, that can be roughly entitled as *import* (*acquisition* and *creation*) and *export* (*offer* and *retrieval*). The import part is responsible for populating the information base. It acquires data from many different sources and has to prepare it for appropriate usage. The second part is concerned with all aspects of retrieval of this data and the presentation of the results to the user. In addition to query mechanisms and visualization techniques, it may provide sophisticated user guidance to assist the user in his or her search for the desired information. Both tasks have to be based on a common metaphor for the handled data. An appropriate modelling is necessary to connect these two parts through the shared information base.

Figure 1 shows further refinements of this whole process of information handling. The graphic mirrors the information flow from the information sources to the terminal application programs and the user. Interconnections between the different actions, like cooperating editors and cycles (e.g. storage of retrieved or edited data) are not taken into account. In the following, we will take a look at the different parts of the information processing task.

2.1 Information Acquisition

Information Import. When an information system has to be built up, it has to be filled with data. The information to be gathered in this state of information handling is of diverse nature and comes in many different structures from many different sources. In addition to existing internal and external databases with more or less structured data, information can reside in simple text files, in expert systems, or in on-line databases

此为试读,需要完整PDF请访问: www.ertongbook.com