# MULTILEVEL OBJECT-ORIENTED DATABASE SYSTEMS

## (Panel Session)

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There is a consensus that object-oriented database management systems will dominate the next generation of commercial products, much as relational database management systems are dominant today. Several approaches to multilevel security for object-oriented systems have been proposed. The underlying assumptions adopted by each one and their motivating forces are somewhat different. This makes a relative comparison difficult since different assumptions and motivations inevitably lead to different design trade-offs.

This panel brings together some of the leading researchers in this arena. Each panelist will present a brief overview of his or her approach, perspective and insights. The panelists have been requested to address the following questions at some point during their presentation.*

1. How much trusted code is required for their architecture? How much reuse of commercial off the shelf software is feasible?

2. How do their systems enforce inheritance? Can the inheritance mechanisms of their systems be used to define and enforce security policies?

3. Do their systems support security policies for composite objects and multilevel composite objects as defined in Catherine Meadows' position paper?

Each panelist has contributed a position paper which is included in these proceedings.

A biographical note on each of the panelists and the panel session chairman is given below (in alphabetical order).

- **Sushil Jajodia** is currently Professor of Information Systems and Systems Engineering at the George Mason University, Fairfax, VA. He is also Principal Scientist in the Security Technical Center at the MITRE Corporation in McLean, VA. Prior to joining GMU in 1988, he directed the Database and Expert Systems Program at the National Science Foundation. He earlier headed the Database and Distributed Systems Section at the Naval Research Laboratory, Washington and was an Associate Professor of Computer Science and Director of Graduate Studies at the University of Missouri, Columbia. He received the Ph.D. from the University of Oregon, Eugene. His current

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*I am indebted to Catherine Meadows for questions 2 and 3, which are posed in her position paper.

research interests include information systems security, database management and distributed systems, and parallel computing. He has published more than 60 technical papers in refereed journals and conferences and has co-edited three books. He is on the editorial board of the IEEE Transactions on Knowledge and Data Engineering. He has edited special issues of the IEEE Transactions on Software Engineering, Journal of Systems and Software, and Bulletin on Data Engineering. He is general co-chair of the 2nd International Symposium on Databases in Parallel and Distributed Systems and program chair of the 4th IFIP Working Group 11.3 Workshop on Database Security. He is a member of the IEEE Computer Society Publication Planning Committee, and has chaired the IEEE Technical Committee on Data Engineering for two years. He is a senior member of the IEEE Computer Society and a member of ACM.

- **Teresa F. Lunt**, of SRI's Computer Science Laboratory, is in charge of computer security research at SRI, where she is leading two landmark programs: the SeaView multilevel secure relational database system and the IDES Intrusion-Detection system. She is also leading a new research area in security for knowledge-based systems and using AI techniques for computer security. Prior to joining SRI in early 1986, she worked at the MITRE Corporation for four years and later at SYTEK's Data Security Division for two years. She has worked on audit trail analysis, automated security guards, security models, and formal verification of secure systems. She received the A.B. degree from Princeton University in 1976 and the M.A. degree in applied mathematics from Indiana University, Bloomington, in 1979. She won Outstanding Paper Award at the 11th National Computer Security Conference in 1988 and Best Paper Award at the 1987 IEEE Symposium on Security and Privacy. She is founding editor and principal contributor to the Data Security Letter. She is currently serving as the program co-chair for the 1991 IEEE Symposium on Security and Privacy.

- **Catherine Meadows** received the B.A. degree in mathematics from the University of Chicago in 1975 and the Ph.D. degree in mathematics from the University of Illinois in 1981. From 1981 to 1985 she was an assistant professor of mathematics at Texas A&M University. Since 1985 she has been employed at the Naval Research Laboratory, currently in the Center for Secure Information Technology. Her research interests include database security, verification of cryptographic protocols, and executable specifications for secure systems. She has published numerous technical papers on her research. She has served on the program committee for the IEEE Symposium on Security and Privacy from 1987 onwards.

- **Jonathan Millen** received his Ph.D. in Mathematics from Rensselaer Polytechnic Institute, Troy, N.Y., in 1969. His Bachelor's degree is from Harvard University in 1963 and his M.S. from Stanford University in 1965, both in Mathematics. He has worked at The MITRE Corporation in Bedford, MA since 1969. In 1988 he became Principal Scientist in the Distributed Processing Systems Division. He has worked in the area of computer security since 1974, with a special interest in formal methods and analysis tools. He established the IEEE Computer Security Foundations Workshop in 1988 and served as the general and program chair for the 1988 and 1989 workshops. He has also served as the program co-chair for the IEEE Symposium on Security and

Privacy in 1984 and 1985. His current activities include modeling a variety of security policies and analysis of covert channels.

- **Ravi Sandhu** is currently an Associate Professor of Information Systems and Systems Engineering at the George Mason University, Fairfax, VA. Prior to that he was an Assistant Professor of Computer Science at the Ohio State University, Columbus. He earlier held R&D and teaching positions at the Indian Institute of Technology, Jawaharlal Nehru University and Hindustan Computers Limited all in New Delhi, India. His research interests include information systems security, multilevel database management systems, models and mechanisms for integrity, and secure distributed systems. He received the B.Tech. degree in Electrical Engineering from the Indian Institute of Technology, Bombay in 1974, the M.Tech. degree in Electrical Engineering from the Indian Institute of Technology, Delhi in 1976, and the M.S. and Ph.D. degrees in Computer Science from Rutgers University in 1980 and 1983 respectively. Ravi Sandhu has authored numerous journal and conference publications on information security. He is the program chairman for the 1991 IEEE Workshop on Computer Security Foundations.

- **Bhavani Thuraisingham** is a lead engineer at the MITRE Corporation. Her current research interests are in database security and the applications of mathematical logic in computer science. Her recent research contributions include security in distributed database management systems, secure object-oriented data models, logic for secure data/knowledge base management systems, techniques for handling the inference problem, and the complexity of the inference problem. She is also leading two team efforts on the design and implementation of a trusted distributed query processor and a database inference controller. Previously Dr. Thuraisingham was at Honeywell Inc. where she was involved with the design of Lock Data Views, and before that at Control Data Corporation where she was involved with the development of CDC-NET. She was also an adjunct professor and member of the graduate faculty in the Department of Computer Science at the University of Minnesota. Dr. Thuraisingham received the M.S. degree in computer science from the University of Minnesota, M.Sc. degree in mathematical logic from the University of Bristol, England, and the Ph.D. degree in recursive functions and computability theory from the University of Wales, Swansea, United Kingdom. She has published over 50 technical papers including over 25 journal articles in database security, distributed processing, AI and computability theory. She is a member of the IEEE Computer Society and ACM.