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Preface

Two years after the First Symposium on the Design and Implementation of Large Spatial Databases (SSD'89), which was held in Santa Barbara, California, the range of spatial database applications has broadened considerably. Whereas traditionally the focus has been on computer-aided design and solid modeling, one can now observe a rapid increase in geographic applications. The market for geographic information systems (GIS) is growing steadily, and so are the demands for more efficient spatial data management capabilities.

The reasons for these new developments are manifold. *First,* the efficient management of geographic maps in computers has become reality only very recently, due to some significant progress in hardware technology. The availability of up to 100 Mips and 100 Megabytes of main memory in a desktop computer, enhanced with optical disks for mass storage, seemed quite unrealistic just a few years ago. Without these powerful workstations, the interactive display and manipulation of geographic information, which is essential for most applications in the field, would not be possible today.

Second, the management of spatial data has been facilitated considerably by some important research results in the areas of database management, computational geometry, and computer graphics. The technology of extensible databases, which allows the integration of abstract data types and user-defined operations into a database system, or the availability of efficient algorithms for geometric operations such as polygon overlay, spatial search, or hidden line elimination are all building blocks that are essential for efficient spatial data management software.

Third, there is an increasing political motivation for having powerful geographic information systems, due to a growing public awareness of environmental protection. Since the late 1960s and the 1970s, when the preservation of the environment first became a major issue, many local governments have made significant progress regarding the *collection* of environmental data. Measuring networks have been installed to obtain more data about the air, the water, and the ground. Satellite images and aerial photographs will soon deliver terabytes of image data *per day*. The problem today is therefore not a lack of data but a lack of efficient systems to manage these huge amounts of data and to transform them into information that really helps the decision maker. Spatial databases, in connection with sophisticated information retrieval tools and fast display devices are one step towards such an efficient *environmental* data management.

Once the need for further spatial database research has been established, the question arises: what's next? Whereas in the last years a lot of emphasis has been put on physical aspects, there now seems to be an increasing interest in logical matters. On the one hand, the integration of object-oriented techniques into spatial data management has led to some interesting new data models and even to some products that have entered the market recently. Especially the modeling of complex geo-objects using structural object-orientation and the investigation of related query optimization issues seem to be promising topics for further research. On the other hand, it may also prove important to integrate deductive capabilities into spatial databases in order to allow for more powerful query languages and optimization techniques and for more sophisticated spatial reasoning capabilities. Many related research results from the artificial intelligence and deductive database communities have come to the attention of

spatial database researchers, and vice versa, which may also lead to some interesting new work.

All this new emphasis on logical aspects of spatial data management does not mean, however, that the problems concerning physical data management are solved. At this point, the huge amounts of data that are anticipated for the late 1990s exceed the capabilities of the most efficient data managers available to date. The development of new techniques for the integration of archival storage devices and for incremental backups and checkpoints are a necessity for the years to come.

It is our hope that the Second Symposium on Large Spatial Databases (SSD'91), which will be held August 28-30, 1991, in Zürich, will help to create new ideas and to found new cooperations between interested researchers. We would like to thank Springer-Verlag for their interest in publishing this proceedings volume; as always, their support and cooperation were excellent. Thanks to the associations GI, SI, ACM, and IEEE for their support, to the program committee members for returning their reviews under great time pressure, and to the authors of all submitted papers for their interest in SSD'91. Thanks also to Hans Hinterberger, Claudia Schmid, and Antoinette Förster for taking care of our local arrangements, and to Carmen Stebisch and Christine Ziegler for administrative support.

Ulm and Zürich, June 1991 The Editors

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