

SIE 698: Spatial Database Systems

3 credits

Fall '97

Max J. Egenhofer
max@spatial.maine.edu

This course complements SIE 451. While SIE 451 focuses on the conceptual and logical aspects of spatial database design, this course focuses on the internals of spatial database systems. Students are expected to be fluent in a high-level programming language (preferably C++, C, or Pascal); FORTRAN or Basic will be inappropriate.

The course will be organized into five parts. Part 1 will deal with physical database aspects, particularly storage and access methods. Students will learn about the internal organization of data in a database system, including performance considerations. Programming assignments will include buffer management, hashing, and implementations of B+ trees. Part 2 will focus on the bread and butter of database updates through transaction management and recovery to avoid loss of data in the case of failures. The particular requirements posed by spatial data management will be addressed in Part 3. Part 4 will cover database aspects and implementations germane to the handling of large spatial datasets. It will emphasize storage and access to complex spatial data types (such as vector data models), indexing through such methods as R-tree, and caching through access by spatial neighborhood. Assignments will include an implementation of an R-tree, the adaptation of the stream buffer (implemented in Part 1) to a car-navigation example, and the implementation of a spatial data model on top of Oracle's Spatial Data Option (SDO). Finally, Part 5 will give an outlook on new and exciting opportunities for spatial database systems, such as content-based retrieval of imagery and video and spatial database systems on the Web.

Recommended text book:

Silberschatz, Korth, and Sudarshan, Database System Concepts, Third Edition, McGraw-Hill, ISBN 0-07-044756-X

Additional readings (will be distributed in class):

Papers by Carey and DeWitt; Güting; Frank; Samet and Aref; Guttman.

Classes:

11:00-11:50 2:10-3:00

Part 1: Physical DB and Architecture

3-Sep	X	
5-Sep	X	
5-Sep		X
8-Sep	X	
8-Sep		X
10-Sep	X	
10-Sep		X
12-Sep	X	
12-Sep		X
15-Sep	X	
15-Sep		X
17-Sep	X	
17-Sep		X
19-Sep	X	

Part 2: Transactions and Recovery

6-Oct	X	
6-Oct		X
8-Oct	X	
8-Oct		X
10-Oct	X	

Part 3: Spatial Requirements

20-Oct	X	
20-Oct		X
22-Oct	X	
22-Oct		X

Part 4: Spatial Database Systems Extensions

29-Oct	X	
29-Oct		X
31-Oct	X	
31-Oct		X
3-Nov	X	
3-Nov		X
5-Nov	X	
5-Nov		X
7-Nov	X	
10-Nov	X	
12-Nov	X	
17-Nov	X	
19-Nov	X	
21-Nov	X	
24-Nov	X	

Part 5: Outlook

8-Dec	X	
10-Dec	X	
12-Dec	X	