MODULE – IV
SPATIAL DATABASE

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Sources:
Pearson Education, Inc. 2011, Elmasri/Navathe, Fundamentals of Database Systems, seventh Edition

Spatial Databases

Spatial Database Concepts

- Keep track of objects in a multi-dimensional space
  - Maps
  - Geographical Information Systems (**GIS**)
  - Weather
- In general spatial databases are n-dimensional
  - This discussion is limited to 2-dimensional spatial databases

Common types of analysis in spatial data `

Analysis Type	Type of Operations and Measurements
Measurements	Distance, perimeter, shape, adjacency, and direction
Spatial analysis/statistics	Pattern, autocorrelation, and indexes of similarity and topology using spatial and nonspatial data
Flow analysis	Connectivity and shortest path
Location analysis	Analysis of points and lines within a polygon
Terrain analysis	Slope/aspect, catchment area, drainage network
Search	Thematic search, search by region

Spatial Data Types and Models

- Map Data
  - Basic Features: points, lines, and polygons
- Attribute Data
- Image Data

Spatial Operators

- Static Operators
  - Topological: Disjoint, Meet, Overlap, Contains, Inside, Covers, Covered by, Equal
  - Projective
  - Metric: area, relative size of an object's parts, Compactness, and symmetry
- Dynamic Operators: alter the objects upon which the operations act
  - create, destroy, and update
  - Update: translate (shift position), rotate (change orientation), scale up or down, reflect (produce a mirror image), and shear (deform)

Spatial Queries

- **Range** query: Finds objects of a particular type within a particular distance from a given location
- **Nearest Neighbor** query: Finds objects of a particular type that is nearest to a given location
- **Spatial joins** or overlays: Joins objects of two types based on some spatial condition (intersecting, overlapping, within certain distance, etc.)