Learning Objectives

- After this segment, students will be able to
 - List building blocks for graph queries
 - Compare 2 algorithms for a connectivity query



Data Models of Spatial Networks

- 1. Conceptual Model: Entity Relationship Diagrams, Graphs
- 2. Logical Data Model: Abstract Data types, Custom Statements in SQL
- 3. Physical Data Model
 - Storage-Structures
 - Algorithms for common operations



Query Processing for Spatial Networks

Query Processing

- DBMS decomposes a query into building blocks
- Keeps a couple of strategy for each building block
- Selects most suitable one for a given situation

Building blocks

- Connectivity(A, B): Is node B reachable from node A?
- Shortest path(A, B): Identify least cost path from node A to node B



Algorithms

- Main memory
 - Connectivity: Breadth first search, depth first search
 - Shortest path: Dijkstra's algorithm, A*
- Disk-based
 - Shortest path Hierarchical routing algorithm
 - Connectivity strategies are in SQL3



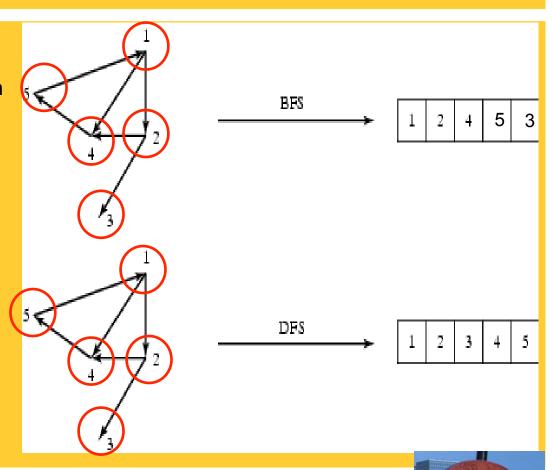
Algorithms for Connectivity Query

Breadth first search

- Visit descendent by generation
- Children before grandchildren
- Example: 1 (2,4) (3, 5)

Depth first search

- Try a path till dead-end
- Backtrack to try different paths
- Like a maze game
- Example: 1-2-3-2-4-5
- Note backtrack from 3 to 2



Spatial Computing

Research Group