

Questions for the Advanced Topics in Databases course exam Fall 2008

Group 1

1. MOST model: basic assumptions, dynamic attributes, representing 2D and network object positions with dynamic attributes.
2. MOST model: database histories, instantaneous vs. continuous queries.
3. FTL query language: query syntax, FTL syntax (symbols, terms, well-formed formulas)
4. FTL query language: FTL semantics (variable assignment, term evaluation, satisfaction of FTL formulas, derived notations)
5. Evaluating FTL queries: restricted conjunctive formulas, basic ideas, answering to instantaneous and continuous queries
6. Evaluating FTL queries: building relations for Case 1, Case 2, and Case 3, algorithm for merging solution intervals

Group 2

7. Evaluating FTL formulas: building relations for Case 4, Case 5, and Case 6
8. Location updates: the information cost of the trip (deviation cost, update cost, uncertainty cost, formula for the total information cost of the trip)
9. Location updates: cost-based optimization for dead-reckoning policies, minimization of the average information cost for **constant** threshold.
10. Location updates: cost-based optimization for dead-reckoning policies, minimization of the average information cost for **continually decreasing** threshold
11. Location updates: speed, adaptive, and disconnection detection dead-reckoning policies.
12. A model of trajectory with uncertainty. Point queries. Spatio-temporal range queries: predicates, relationships between predicates.

Group 3

13. A model of trajectory with uncertainty. Algorithms for point queries, **PossiblySometimesInside** and **PossiblyAlwaysInside**.
14. A model of trajectory with uncertainty. Algorithms for point queries, **DefinitelyAlwaysInside** and **SometimesDefinitelyInside**.
15. History of Movement in 2D. The data types of the Discrete Model (DM): basic types, time type, and spatial types (*point*, *points*, *line*, and *region*).
16. History of Movement in 2D. The data types of the Discrete Model (DM): type constructors, sliced representation of temporal types, *real* units, and *point* units,

17. History of Movement in 2D. The data types of the Discrete Model (DM): *points* units, *line* units, *region* units. _
18. Data structures for the DM: basic principles, base types, *point* type, and *points* type.

Group 4

19. Data structures for the DM: basic principles, *line* type, *region* type.
20. Data structures for the DM: basic principles, temporal types, moving region unit, and moving region value.
21. Algorithm for **locations: mpoint -> points**. Complexity of this algorithm. Similar algorithms.
22. Algorithm for **inside: mpoint x mregion -> mbool** (with refinement partitioning). Similar algorithms. Complexity of these algorithms.
23. Algorithm for **at: mpoint x points -> mpoint**. Similar algorithms. Complexity of these algorithms.
24. Algorithms for **atperiods: mregion x periods -> mregion** (version 1) and **atinstant: mregion x instant -> iregion**. Similar algorithms. Complexity of these algorithms.

Group 5

25. Algorithms for **atperiods: mregion x periods -> mregion** (version 2) and **atinstant: mregion x instant -> iregion**. Similar algorithms. Complexity of these algorithms.
26. Algorithm **equals: mregion x region -> mbool**. Complexity of this algorithm.
27. Algorithm **equals: mregion x mregion -> mbool**. Complexity of this algorithm.
28. Algorithm **area: mregion -> mreal**. Complexity of this algorithm.
29. Periodic moving objects. Representation of periodic movement: goals, basic ideas. Relative intervals. Periodic temporal types.
30. Periodic moving objects: the tree representation.

Group 6

31. Periodic moving objects: SECONDO representation of the tree.
32. Periodic moving objects: conversion from the flat to the tree representation, operations.
33. History of Movement in Networks. Network definitions: route, route measure, junction, network
34. History of Movement in Networks. Network definitions: route location, route interval, network region
35. History of Movement in Networks. Junction definition. Connectivity codes.
36. History of Movement in Networks. Data types. Type system extended.

Group 7

37. History of Movement in Networks. Data structures: principles, *gpoint* type, *gline* type, temporal data types, moving network point.
38. History of Movement in Networks. Data structures: principles, temporal data types, moving network region unit, “complete” moving network region
39. History of Movement in Networks. Data structures for *network* type: main requirements, relational representation, graph representation, adjacency list
40. Sequenced, Spatio-Temporal (SST) Aggregation: space model, car positions, spatio-temporal relations, definition of SST aggregation.
41. SST Aggregation: definition of SST aggregation, data structure for the SST aggregation, Naively Extended Balanced Tree
42. SST Aggregation: definition of SST aggregation, Naively Extended Balanced Tree, optimizations

Group 8

43. SST Aggregation: definition of SST aggregation, SST-tree, SST-tree implementation, top level SST-tree algorithm
44. SST Aggregation: definition of SST aggregation, SST-tree, SST-tree implementation, LoadTree algorithm
45. SST Aggregation: definition of SST aggregation, SST-tree, SST-tree implementation, ComputeConstRect algorithm
46. SST Aggregation: definition of SST aggregation, SST-tree, SST-tree implementation, top level SST-tree algorithm
47. SST Aggregation: definition of SST aggregation, SST-tree, SST-tree implementation, LoadTree algorithm
48. SST Aggregation: definition of SST aggregation, SST-tree, SST-tree implementation, ComputeConstRect algorithm