Lectures for the course: Foundations of Computing Systems (IT60101)

Week 1
Lecture 1 – 24/07/2006
• Introduction to the course
• Background knowledge of students
• Planned topics

Lecture 2 – 27/07/2006
• Insertion Sort
• Loop Invariant
• Time Complexity Analysis of Insertion Sort

Week 2
Lecture 3 – 31/07/2006
• Analysis of Bubble Sort
• Loop-invariant

Lecture 4 – 02/08/2006
• Divide and Conquer paradigm
• Merge Sort and its Analysis

Week 3
Lecture 5 – 07/08/2006
• Growth of functions
• O and o notations

Lecture 6 – 09/08/2006
• Θ and Ω notations

Class Test 1 held on 10/08
Week 4

Lecture 7 – 14/08/2006
  • Recurrence Relations
  • Solution to recurrence relation using Substitution method

Lecture 8 – 16/08/2006
  • Solution to recurrence relation using Iterative/Recurrence Tree method
  • Solution to recurrence relation using Master method

Week 5

Lecture 11 – 21/08/2006
  • Quick Sort

Lecture 12 – 23/08/2006
  • Randomized Quick Sort
  • Average Analysis of Randomized Quick Sort

Week 6

Lecture 13 – 28/08/2006
  • Lower bound on comparison sorts
  • Counting Sort

Lecture 14 – 30/08/2006
  • Radix Sort
  • Introduction to Red-Black Trees

Week 7

Lecture 15 – 04/09/2006
  • Red-Black Tree properties
  • Bound on the height of a Red-Black Tree

Lecture 16 – 06/09/2006
  • BST Rotate
  • Insert in Red-Black Tree
Week 8
• R-Tree

Lecture 18 – 13/09/2006
• R-Tree Construction

Week 9
Mid-Sem exam was held at this time

Week 10
• R-Tree Insert
• Node Split

Lecture 18 – 26/09/2006
• R-Tree Nearest Neighbor Search

Week 11
Autumn Break

Week 12
Lecture 20 – 09/10/2006
• Graph Algorithms
• BFS

Lecture 21 – 11/10/2006
• DFS
• MST
• Kruskal’s Algorithm

Week 13
Lecture 22 – 16/10/2006
• Prim’s Algorithm
• Introduction to Shortest Paths problems

Lecture 23 – 18/10/2006
• Dijkstra’s SP
• Bellman-Ford

Week 14

Lecture 24 – 23/10/2006
• Dynamic Programming – Assembly Line Problem

Lecture 25 – 25/10/2006
• Holiday

Week 15

Lecture 26 – 30/10/2006
• Dynamic Programming – Matrix Parenthesization Problem

Lecture 27 – 01/11/2006
• No Class

Week 16

Lecture 28 – 06/11/2006
• Greedy Approach
• Activity Selection Problem – Dynamic Programming formulation

• Activity Selection Problem – Greedy formulation
• 0-1 Knapsack and Fractional Knapsack

Week 17

• Introduction to P, NP and NP Complete Problems

- Summary and Feedback