Introduction to Algorithm Engineering

In-Class Quiz, Spring 2024

April 2, 2024, 830 AM.

International Institute of Information Technology, Hyderabad

Instructions:

- The quiz runs for 45 minutes.
- The maximum points is 20.
- No queries shall be answered during the quiz. If needed, you should make necessary assumptions. Points awarded will depend on the nature of the assumptions.
- Answer all parts of each question contiguously.

Question 1. Choose a graph of about 10 vertices and 15 edges. Run the algorithm of Tarjan-Vishkin on this graph and show the auxiliary graph. Find the connected components of the auxiliary graph and hence obtain the biconnected components of the graph. **(4 Points)**

Question 2. Define the term ear decomposition of a graph and state the necessary and sufficient condition(s) for a graph to have an ear decomposition. **(4 Points)**

Question 3. Distinguish between cache-aware and cache-oblivious algorithms. Consider the problem of sorting using merge sort. Write pseudocode for a cache-oblivious merge sort algorithm. Analyze the pseudocode for the number of cache misses using appropriate parameters. **(4+3+5=12 Points)**