

Agenda

RANDOMIZED ALGORITHMS – INTRODUCTION

- LAS VEGAS AND MONTE CARLO

Las Vegas and Monte Carlo

- A randomized algorithm that always gives the correct solution is said to be a ***Las Vegas*** algorithm
 - E.g. Randomized Quicksort where the only variation from one run to another is the time complexity
- A randomized algorithm that may produce an incorrect solution is said to be a ***Monte Carlo*** algorithm.
 - Q: Have you seen an example?
 - Bloom Filter vs. Hash Table

Hash Tables vs. Bloom Filters

- What is the difference between bucket / bin sorting and hashing?
 - Key Ranges?
 - Locations?
- Hashtables provide a *Las Vegas* algorithm for storing / retrieving a record in a dictionary data structure.
 - What about Bloom Filters?
 - When a Bloom Filter returns:
 - a **yes** answer to a **find** query it may be erring with a small probability
 - a **no** answer to a **find** query it is always correct

Monte Carlo algorithms

- Such techniques are referred to as 1-way error Monte Carlo algorithms and
 - usually the error probability is bounded by a small fraction.
- REVIEW EXERCISE:
 - Calculate the false positive rate for a Bloom Filter given:
 - M the size of the table,
 - b the number of bits per record (which is 1 by default),
 - d the number of hash functions used, and
 - N the number of entries.