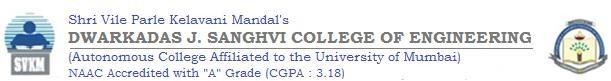
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# Department of Information Technology A.Y. 2024-2025

**Class: TY BTech-IT, Semester: VI**

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**ROLL NO: I011 BATCH: 01**

1. **Aim:** To implement Bloom’s filter.

1. **Requirements:** PC, Internet

1. **Theory:**

**Students need to write the theory on the following points.**

* + Importance of Blooms filter
  + Applications of Blooms filter

1. **Procedure**
   * Implement the Bloom’s filter in C/JAVA/Python
   * Attach program code and Output.

**CODE:**

import java.util.BitSet;

import java.util.Random;

public class BloomFilter { private final int size; private final BitSet bitSet; private final int numHashFunctions; private final int[] hashSeeds;

public BloomFilter(int size, int numHashFunctions) { this.size = size;

this.numHashFunctions = numHashFunctions; this.bitSet = new BitSet(size);

this.hashSeeds = new int[numHashFunctions];

// Generate random seeds for hash functions Random random = new Random(); for (int i = 0; i < numHashFunctions; i++) { hashSeeds[i] = random.nextInt();

}

}

// Simple hash function

private int hash(String data, int seed) { int hash = 0;

for (char c : data.toCharArray()) {

hash = hash \* 31 + c + seed; // A basic polynomial rolling hash

}

return Math.abs(hash % size);

}

// Insert element into Bloom Filter public void add(String data) { for (int seed : hashSeeds) { int hash = hash(data, seed);

bitSet.set(hash);

}

}

// Check if element is possibly in the set public boolean contains(String data) { for (int seed : hashSeeds) { int hash = hash(data, seed); if (!bitSet.get(hash)) {

return false; // Definitely not in the set

}

}

return true; // Probably in the set (but could be a false positive)

}

public static void main(String[] args) {

BloomFilter bloomFilter = new BloomFilter(1000, 5); // 1000 bits, 5 hash functions

// Adding elements bloomFilter.add("hello"); bloomFilter.add("world");

// Checking membership

System.out.println("Contains 'hello': " + bloomFilter.contains("hello")); // True

System.out.println("Contains 'world': " + bloomFilter.contains("world")); // True System.out.println("Contains 'java': " + bloomFilter.contains("java")); // False (most likely)

}

}

**OUTPUT:**

Contains 'hello': true

Contains 'world': true

Contains 'java': false

**5. Conclusion:**

▪ Summary of what was performed in the experiment.