

CS301 GDB No1 Spring 2023

In that case, I would choose the Queue data structure for efficient path generation in the given scenario.

Justification:

The Queue data structure is better suited for this scenario compared to the Stack data structure for the following reasons:

1. **First-In-First-Out (FIFO) Property:** The Queue follows the FIFO principle, ensuring that the element added first is the one that will be removed first. This property is crucial for the inspection team as they need to visit the virtual campuses in the order they were added or discovered. By maintaining the order of discovery, the inspection team can cover the campuses systematically without missing any.
2. **Neighboring Cities First:** The problem statement mentions the possibility of starting from Kashmir, finishing the campuses of neighboring cities first, and then moving towards Karachi. A Queue aligns well with this requirement. The inspection team can enqueue the campuses of neighboring cities as they encounter them, ensuring that these campuses are visited before moving on to distant locations. This approach enables a more organized and efficient coverage of campuses.
3. **Breadth-First Search (BFS) Strategy:** The Queue data structure is commonly used in BFS algorithms. In this scenario, the inspection team can consider each campus as a node in a graph, and the connections between campuses as edges. By using a Queue, the inspection team can perform a BFS-like traversal, visiting the campuses at a certain distance from the starting point before moving on to the next level. This strategy ensures that all campuses are covered within the given time frame.

Mechanism of the Queue data structure for efficient path generation:

1. Initialize an empty Queue to store the campuses to be visited.
2. Start with a known campus (e.g., Kashmir) and enqueue it into the Queue.
3. While the Queue is not empty, repeat the following steps:
 - a. Dequeue the first campus from the Queue.
 - b. Inspect the campus based on the required factors (seating plan, internet and computers performance, cleanliness, etc.).
 - c. Enqueue the neighboring campuses of the current campus into the Queue, if they have not been visited before.

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d. Repeat the process until all campuses have been visited or until the two-week deadline is reached.

By using the Queue data structure, the inspection team can ensure a systematic and organized visitation of all or maximum possible campuses. The neighboring campuses are explored first, followed by other campuses in a breadth-first manner, adhering to the given time constraints.



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