Consider a classical vacuum cleaner problem where we have two rooms and one vacuum cleaner. There is dirt in both the rooms and it is to be cleaned. The vacuum cleaner is present in any one of these rooms. So, we have to reach a state in which both the rooms are clean and are dust free. Explain all possible states in vacuum cleaner problem with the help of state representation diagram.

In the classical vacuum cleaner problem, we have two rooms (Room A and Room B) and a vacuum cleaner that can be in either of the two rooms. The goal is to clean both rooms, removing the dirt from them.

State 1

Room A: [Dirty] Room B: [Dirty] Vacuum: [Room A]

This initial state represents both rooms being dirty, and the vacuum cleaner being in Room A.

Now, there are two possible actions the vacuum cleaner can take:

1. **Suck**: The vacuum cleaner can clean the room it's currently in.
2. **Move**: The vacuum cleaner can move to the other room.

Let's represent the possible actions and resulting states:

Action: Suck Room A: [Clean] Room B: [Dirty] Vacuum: [Room A]

In this state, the vacuum cleaner has cleaned Room A.

Action: Move Room A: [Clean] Room B: [Dirty] Vacuum: [Room B]

In this state, the vacuum cleaner has moved to Room B.

Action: Suck Room A: [Clean] Room B: [Clean] Vacuum: [Room B]

In this state, the vacuum cleaner has cleaned Room B.

Action: Move Room A: [Clean] Room B: [Clean] Vacuum: [Room A]

In this state, the vacuum cleaner has moved back to Room A.

Now both rooms are clean, and the vacuum cleaner has returned to its original room. The problem is solved.

So, the possible states in the vacuum cleaner problem are as follows:

1. Both rooms are dirty, and the vacuum cleaner is in Room A.
2. Room A is clean, Room B is dirty, and the vacuum cleaner is in Room A.
3. Room A is clean, Room B is dirty, and the vacuum cleaner is in Room B.
4. Both rooms are clean, and the vacuum cleaner is in Room B.
5. Both rooms are clean, and the vacuum cleaner is in Room A.

These states demonstrate the sequence of actions that the vacuum cleaner can take to clean both rooms and return to its starting position.

Top of Form