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Problem solving assignment:
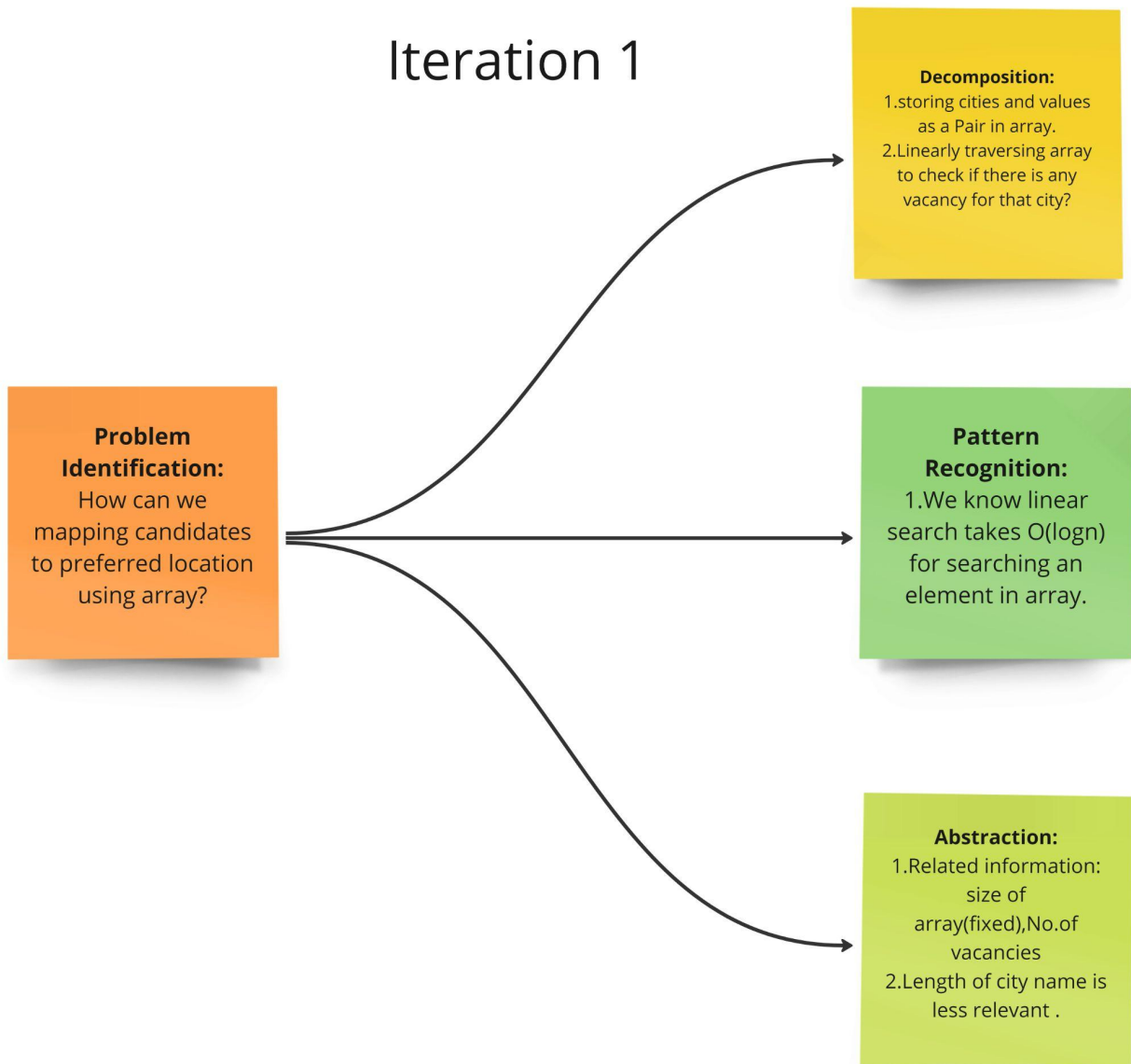
Problem Statement:

John is a recruiter in a company and wants to map candidates based on their location preferences. Develop an algorithm to match candidates to the locations based on their preferences.

Explanation: The number of vacancies, number of cities , number of users are not mentioned here. So,assuming
number of vacancies range [10,25],
Number of cities = 10.
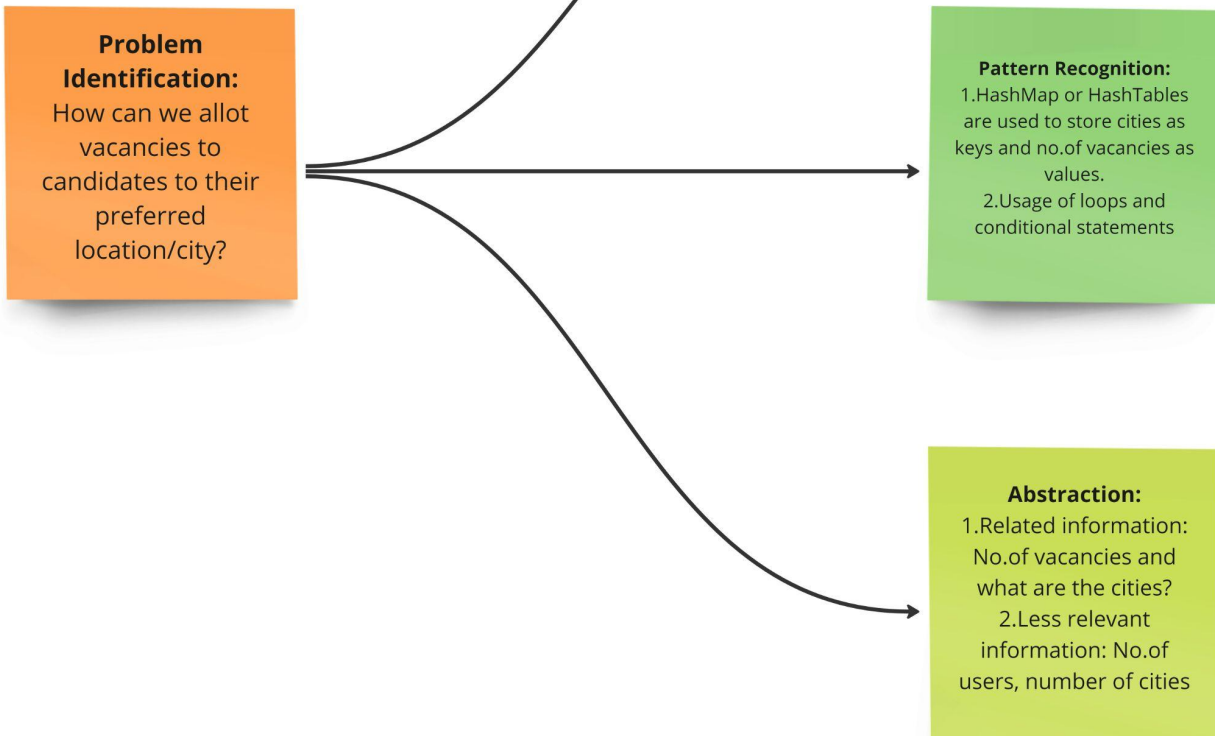
Name of location/city	Number of vacancies available
hyderabad	10
bangalore	16
pune	18
chennai	17
mumbai	16
delhi	23
noida	20
nagpur	11
Coimbatore	15
Kolkata	13

Graphic organizer:

Iteration 1

Problem Identification:
How can we mapping candidates to preferred location using array?

Decomposition:
1. storing cities and values as a Pair in array.
2. Linearly traversing array to check if there is any vacancy for that city?

Pattern Recognition:
1. We know linear search takes $O(\log n)$ for searching an element in array.

Abstraction:
1. Related information: size of array(fixed),No.of vacancies
2. Length of city name is less relevant .

Iteration 2

Problem Identification:
How can we allot vacancies to candidates to their preferred location/city?

Decomposition:
1. Storing no. of available vacancies for each city
2. Iteratively checking if we can allot preferred city to user or not
3. Fetching no. of vacancies available and decrementing

Pattern Recognition:
1. HashMap or HashTables are used to store cities as keys and no.of vacancies as values.
2. Usage of loops and conditional statements

Abstraction:
1. Related information: No.of vacancies and what are the cities?
2. Less relevant information: No.of users, number of cities

Algorithm:

Step1: Initialize Map and store cities as keys and no.of vacancies as values.
Step2: Read firstCity.
Step3: if Map.contains(firstCity) then step4 otherwise step5
Step4: output "Alloted" and go to step11
Step5 : Read secondCity
Step6: if Map.contains(secondCity) then step 7 otherwise step8.
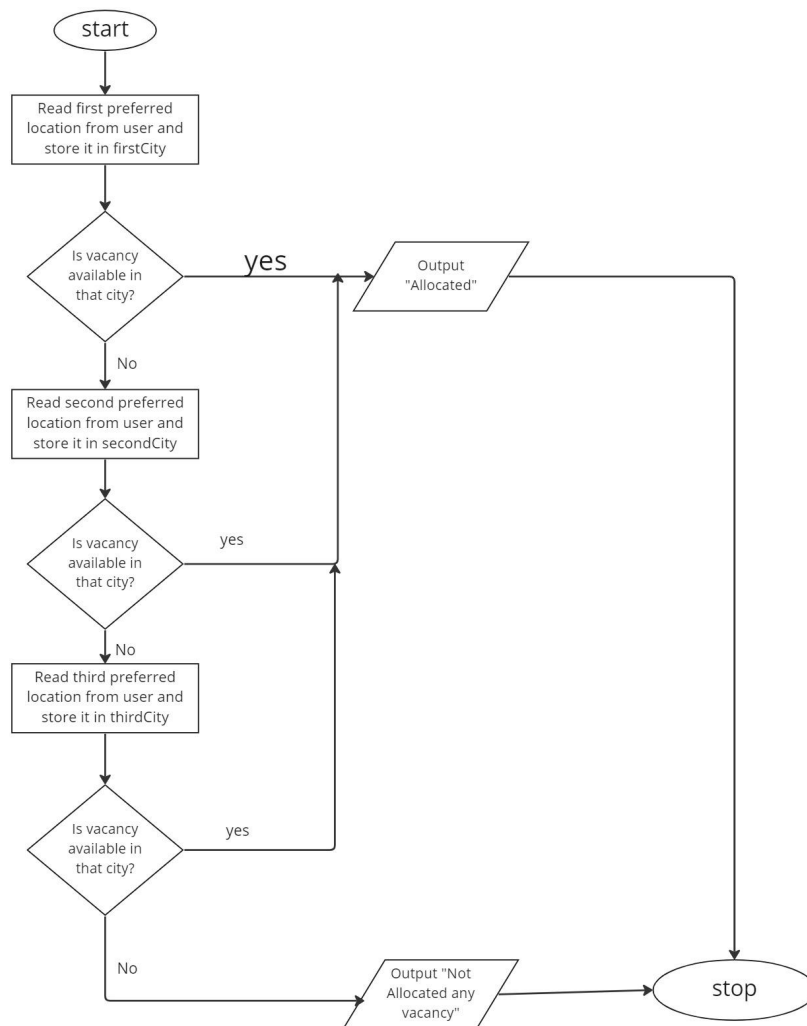**Step7**: output "Alloted" and go to step11
Step8: Read thirdCity.
Step9: if Map.contains(thirdCity) then step 10 otherwise step11.
Step10: output "Alloted" and go to step11
Step11: stop

Flow chart :

Output screenshots:

```
candidate:1 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:2 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:3 Enter your first preference city:
bangalore
Your Preferred city bangalore is allocated
candidate:4 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:5 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:6 Enter your first preference city:
hyderabad\
Enter your Second preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:7 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:8 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:9 Enter your first preference city:
bangalore
Your Preferred city bangalore is allocated
candidate:10 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:11 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:12 Enter your first preference city:
hyderabad
Your Preferred city hyderabad is allocated
candidate:13 Enter your first preference city:
bangalore
Your Preferred city bangalore is allocated
candidate:14 Enter your first preference city:
hyderabad
No vacancies at hyderabad location
Enter your Second preference city:
bangalore
Your Preferred city bangalore is allocated
candidate:15 Enter your first preference city:
exit

Process finished with exit code 0
```