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Question1: Finding the Shortest Path Imagine you are developing a GPS navigation system. You are given a map with various locations and the roads connecting them. Your task is to write an algorithm to find the shortest path from one location to another. You can assume that you have a list of locations and the distance between each pair of locations. Your algorithm should output the shortest path and the total distance.

Algorithm

- **Step1:** Start the Program.
- **Step2:** Enter Your Location and Destination.
- **Step3:** Check all the available paths for this location to destination and do the following processes.
- **Step4:** If there was only one available path from location to destination then print that path.
- **Step5:** If Paths were more than one then Compare Total Distances of All the available Paths with each other.
- **Step6:** if each path had a different distance from another one then Print the Shortest path.
- **Step7:** and if more than one shortest path had the same distance in the available paths then give choice to the user to choose their path.
- **Step8:** Finally Print the Shortest Path and Distance Between location and destination of this path.
- **Step9:** End the Program

Question 2: Sorting a List of numbers, you are working on a project where you need to sort a list of numbers in ascending order. Design an algorithm to efficiently sort a list of integers. You should consider various sorting algorithms, evaluate their time complexity, and choose the most suitable one for the task.

Algorithm:

- **Step1:** Start the Program.
- **Step2:** Enter the Series of Numbers You Want To sort.
- **Step3:** If User Input was invalid (e.g.: Letter, sign etc.), then print the message “Invalid Information” and end the Program.
- **Step4:** If amount of digits in the series was equal to 1 then print the Entered series without any changes.
- **Step5:** if the amount of digits in the series was greater than 1.
 - 1) If there were more than 1 digits with same value so, take just one digit from these digits and continue the process of arranging digits.
- **Step6:** To arrange the digits, we should compare each digit with the digit located in front of them.
 - 1) If the leading digit was smaller than the trailing digit don't bring any changes and keep this process going.
 - 2) If the leading digit becomes bigger than the trailing digit in this situation swap these two digits places. This process should be going until all the leading digits become smaller than trailing digits.
- **Step7:** After this Process print the Arranged Series.
- **Step8:** End the Program.

Question 3: Calculating Fibonacci Numbers, The Fibonacci sequence is a series of numbers where each number is the sum of the two preceding ones (e.g., 0, 1, 1, 2, 3, 5, 8, 13, ...). Write an algorithm to calculate the nth Fibonacci number. Your algorithm should be efficient and capable of handling large values of n.

Algorithm

- **Step1:** Start The Program.
 - 1) Fix these Values in the Program (Fibonacci of 0 and 1 is Equal to 0 and Fibonacci of 2 is 1).
- **Step2:** Ask The User to Enter a positive Number they Want Find There Fibonacci.
- **Step3:** If The Number Was less than zero.
 - 1) Print the message ("Please Enter a Positive Number).
 - 2) Rerun The Program.
- **Step4:** Else if number Was greater than zero. than do the Following Process.
 - 1) Save This Number as F_N .
 - 2) To Calculate the Value of F_N , first we will take this value as an example ($0+1=1$) in Which 0 represents 1's Fibonacci and the first 1 is representing 2's Fibonacci and the second 1 represents 3's Fibonacci. // in the example above, we find that new Fibonacci can be found by adding $(N-1) + (N-2)$, $(N-1)$ is 1 value before N and $(N-2)$ is 1 value before $(N-1)$.
 - 3) To find F_N We Do this Process N Times to Find F_N . By Using This Formula ($F_N = F_{(N-1)} + F_{(N-2)}$). in this Formula F_N Represents a Number of which we are finding the Fibonacci and $F_{(N-1)}$ Represent the Previous Fibonacci Before F_N and $F_{(N-2)}$ represent The Previous Fibonacci Before $F_{(N-1)}$.
- **Step5:** Print The F_N .
- **Step6:** End The Program.

Question 4: Inventory Management You are tasked with creating an algorithm for a store's inventory management system. Your algorithm should be able to add and remove items from the inventory, update the quantity of existing items, and generate reports of the items and their quantities. Design an algorithm that efficiently manages the store's inventory based on these requirements.

Algorithm

- **Step1:** Start the Program.
- **Step2:** Give a List Of four choices (Add Item, Remove Item, Update the Quantity of An existing item And Generate The Report Of the Items and their Quantity). To the inventory System manager.
- **Step3:** If System manager Entered Add Item.
 - 1) Check if this item is already available or not.
 - **If** it was available, then Ask System manager for item name and QR code then increase its quantity on the inventory thesaurus.
 - **But if** it wasn't available, then Ask to Enter Name and QR code of that item and then add it to the inventory thesaurus.
 - 2) Go back to the main menu. *// For Avoiding Complexity in the System, We Should Add Name and QR code of an item.*
- **Step4:** Else if System Manager Entered Removing item.
 - 1) Ask for the name and QR code.
 - If Name and QR were invalid, then print error and rerun the step.
 - If Name and QR were valid then do the following process.
 - check that is it available on the thesaurus of inventory or not.
 - **If** item was not available on the inventory thesaurus, then give error that this item is not available. And rerun the program.
 - **Else if** item was available. Then, decrease the item quantity in the inventory thesaurus.
 - 2) Go back to the mean menu.
- **Step5:** Else if System Manager Entered Update the Quantity of Existing item.
 - 1) Ask for name and QR code and check that is it available or not.
 - If Name and QR were invalid, then print error and rerun the step.
 - If Name and QR were valid then do the following process.
 - **If** the item wasn't available, then give an error that item isn't available. And rerun the step.
 - **But if** item was available then Set the Item Quantity to a new Quantity.
 - 2) Go back to the mean menu.
- **Step6:** Else if System Manager Entered generate report of items and their quantities.
 - 1) Then create an empty list for sorting the report.
 - 2) review each item and its price in the inventory thesaurus.
 - 3) Generate The Report of the Items and their Quantity.
 - 4) Go back to the main menu.
- **Step6:** Press (Q) For Ending the Program.