Bahria University, Islamabad

Department of Software Engineering

Computer Programming

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Assignment # 1
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GitHub

Hashir Asad Hasan Zahid

Comments:

Signature

LAB

Assignment 1: Problem Solving

Question 1: 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.

Solution:

Step 1: Start

Step2: Input distances, d1, d2&d3

Step 3: If d1>d2

Shortest_Distance= d2

Step 4: Else if d2>d1

Shortest_Distance= d1

Step 5: Else if d3> d1

Shortest_Distance= d1

Step 6: Else if d3>d2

Shortest_Distance= d2

Step 7: Else

Shortest_Distance= d3

Step 8: Print “Shortest route (Shortest_Distance) for your journey has been selected, you may proceed”

Step 9: End

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.

Solution:

Step 1: Start

Step 2: Input numbers, n1, n2 & n3

Step 3: If n1 is greater than n2

Step 4: Swap n2 to n1 position

Step 5: Else if n2 is greater than n1

Step 6: Swap n1 to n2 position

Step 7: Else if n3 is greater than n1

Step 8: Swap n1 to n3 position

Step 9: Else if n3 is greater than n2

Step 10: Swap n2 to n3 position

Step 11: Else swap n3 to first position

Step 12: Print sorted numbers n1, n2, n3

Step 13: End

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.

Solution:

Step 1: Start

Step 2: Input number n

Step 3: If n is 0 or 1, output n and stop

Step 4: Initialize a to 0 and b to 1

Step 5: While n is greater than 1:

- Add a and b together
- Store result of a and b in c
- a=b and b=c
- Decrement n by 1

Step 6: Output b

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.

Solution:

Step 1 – Start

Step 2 - Display Menu

Output:

- 1. Add item

- 2. Remove item

- 3. Update item

- 4. Generate report

- 5. Exit

Step 3 – If user input/choice=1

- Add Item:

- Input item name, price, and quantity.

- If the item name is empty:

- Output "Invalid item name."

- Continue = True? Go to **Step 2**. If False:

- Exit.

- If the price is less than zero:

- Output "Invalid price."

-Continue = True? Go to **Step 2.** If False:

- Exit.

- If the quantity is less than zero:

- Output "Invalid quantity."

-Continue = True? Go to **Step 2.** If False:

- Exit.

- Assign a unique identifier for the item.

- Create a product record with identifier, price, name, and quantity.

-Add more items? Repeat

- Add the product record to the inventory.

Step 4 – If user input/choice=2

- Remove Item:

- Input identifier.

- Search for the item with the given identifier in the inventory.

-Remove product record

- If the item is not found:

-Output "Invalid item."

-Continue = True? Go to **Step 2.** If False:

- Exit.

Step 5 - If user input/choice=3

- Update Item:

- Input identifier.

- Search for the item with the given identifier in the inventory.

- If the item is not found:
  - Output "Invalid item."
  - Continue = True? Go to **Step 2.** If False:
  - Exit

- Else Update the item's information (price, name, or quantity)

Step 6 - If user input/choice=4

- Generate Report:

- Output the inventory: all product records (identifier, price, name, quantity)

Step 7 - If user input/choice=5

-End