

Lab Exercise 1

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Implement Matrix manipulation .

Consider the 2D representation for your chosen domain. Perform all data structure operations (insertion, Deletion, linear search) using 2D arrays for any chosen logical data of your domain. Implement any two matrix operations.

```
#include <stdio.h>
#include <string.h>

#define ROWS 3
#define COLS 4

// Define a structure for the pharmacy
struct Medicine {
    int id;
    char name[50];
    float price;
    int quantity;
};

// Define an array of medicines
struct Medicine pharmacy[100];
int medicineCount = 0;

// Function to enter sales values for a matrix
void enterSalesMatrix(int mat[ROWS][COLS], char *matrixName) {
    printf("Enter sales values for %s (3x4 matrix):\n", matrixName);
    for (int i = 0; i < ROWS; i++) {
        for (int j = 0; j < COLS; j++) {
            printf("Enter sales value for Day %d, Product %d: ", i + 1, j
+ 1);
            scanf("%d", &mat[i][j]);
        }
    }
}
```

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    }
}

// Function to display a matrix
void displayMatrix(int mat[ROWS][COLS]) {
    for (int i = 0; i < ROWS; i++) {
        for (int j = 0; j < COLS; j++) {
            printf("%5d", mat[i][j]);
        }
        printf("\n");
    }
}

// Function to add a new medicine to the pharmacy
void addMedicine() {
    printf("Enter the ID of the Medicine: ");
    scanf("%d", &pharmacy[medicineCount].id);

    printf("Enter the Name of the Medicine: ");
    scanf("%s", pharmacy[medicineCount].name);

    printf("Enter the Price of the Medicine: ");
    scanf("%f", &pharmacy[medicineCount].price);

    printf("Enter the Quantity of the Medicine: ");
    scanf("%d", &pharmacy[medicineCount].quantity);

    medicineCount++;

    printf("Medicine added successfully!\n");
}

// Function to delete a medicine based on ID
void deleteMedicine(int id) {
    int i, j;
    int deleteIndex = -1;

    for (i = 0; i < medicineCount; i++) {
        if (pharmacy[i].id == id) {
            deleteIndex = i;

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        break;
    }
}

if (deleteIndex == -1) {
    printf("Medicine with ID %d not found.\n", id);
    return;
}

for (j = deleteIndex; j < medicineCount - 1; j++) {
    pharmacy[j] = pharmacy[j + 1];
}

medicineCount--;

printf("Medicine with ID %d has been deleted.\n", id);
}

// Function to search for a medicine by name
void searchMedicine(char *searchName) {
    int i;
    int found = 0;

    for (i = 0; i < medicineCount; i++) {
        if (strcmp(pharmacy[i].name, searchName) == 0) {
            printf("Medicine Found!\n");
            printf("ID: %d\nName: %s\nPrice: %.2f\nQuantity: %d\n",
pharmacy[i].id, pharmacy[i].name, pharmacy[i].price,
pharmacy[i].quantity);
            found = 1;
            break;
        }
    }

    if (!found) {
        printf("Medicine not found with the name: %s\n", searchName);
    }
}

int main() {

```

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int choice;

// Define matrices for sales data
int salesMatrix1[ROWS][COLS] = {0};
int salesMatrix2[ROWS][COLS] = {0};
int resultMatrix[ROWS][COLS];

do {
    // Menu for pharmacy and matrix operations
    printf("\nPharmacy Management System & Matrix Operations \n");
    printf(" 1. Add Medicine
\n");
    printf(" 2. Show All Medicines
\n");
    printf(" 3. Delete Medicine
\n");
    printf(" 4. Search Medicine by Name
\n");
    printf(" 5. Enter Sales Data (Matrix 1)
\n");
    printf(" 6. Enter Sales Data (Matrix 2)
\n");
    printf(" 7. Perform Matrix Addition
\n");
    printf(" 8. Perform Matrix Subtraction
\n");
    printf(" 9. Exit Program
\n");

    printf("Enter your choice: ");
    scanf("%d", &choice);

    switch (choice) {
        case 1:
            addMedicine();
            break;
        case 2:
            if (medicineCount == 0) {
                printf("No medicines in the pharmacy.\n");
            } else {
                printf("Medicine Inventory:\n");
            }
        }
    }
} while (choice != 9);

```

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        for (int i = 0; i < medicineCount; i++) {
            printf("ID: %d\nName: %s\nPrice: %.2f\nQuantity:
%d\n\n", pharmacy[i].id, pharmacy[i].name, pharmacy[i].price,
pharmacy[i].quantity);
        }
    }
    break;
case 3:
    if (medicineCount == 0) {
        printf("No medicines to delete.\n");
    } else {
        int delId;
        printf("Enter the ID of the medicine to delete: ");
        scanf("%d", &delId);
        deleteMedicine(delId);
    }
    break;
case 4:
    if (medicineCount == 0) {
        printf("No medicines to search.\n");
    } else {
        char searchName[50];
        printf("Enter the name of the medicine you want to
search: ");

        scanf("%s", searchName);
        searchMedicine(searchName);
    }
    break;
case 5:
    enterSalesMatrix(salesMatrix1, "Matrix 1");
    break;
case 6:
    enterSalesMatrix(salesMatrix2, "Matrix 2");
    break;
case 7:
    // Perform matrix addition
    for (int i = 0; i < ROWS; i++) {
        for (int j = 0; j < COLS; j++) {
            resultMatrix[i][j] = salesMatrix1[i][j] +
salesMatrix2[i][j];

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        }

    }

    printf("Matrix Addition Result:\n");
    displayMatrix(resultMatrix);
    break;

case 8:
    // Perform matrix subtraction
    for (int i = 0; i < ROWS; i++) {
        for (int j = 0; j < COLS; j++) {
            resultMatrix[i][j] = salesMatrix1[i][j] -
salesMatrix2[i][j];
        }
    }

    printf("Matrix Subtraction Result:\n");
    displayMatrix(resultMatrix);
    break;

case 9:
    printf("Exiting the program.\n");
    break;

default:
    printf("Invalid choice. Please select a valid option.\n");
}

} while (choice != 10);

return 0;
}

```

```
PS D:\Progrmming\DSA\labworks> .\Matrix_manipulation.exe
```

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 1

Enter the ID of the Medicine: 101

Enter the Name of the Medicine: Paracetamol

Enter the Price of the Medicine: 15

Enter the Quantity of the Medicine: 100

Medicine added successfully!

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 1

Enter the ID of the Medicine: 102

Enter the Name of the Medicine: Aspirin

Enter the Price of the Medicine: 50

Enter the Quantity of the Medicine: 120

Medicine added successfully!

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 2

Medicine Inventory:

ID: 101

Name: Paracetamol

Price: 15.00

Quantity: 100

ID: 102

Name: Aspirin

Price: 50.00

Quantity: 120

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 4

Enter the name of the medicine you want to search: Aspirin

Medicine Found!

ID: 102

Name: Aspirin

Name: Aspirin
Price: 50.00
Quantity: 120

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 3

Enter the ID of the medicine to delete: 101

Medicine with ID 101 has been deleted.

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 3

Enter the ID of the medicine to delete: 101

Medicine with ID 101 not found.

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 5

Enter sales values for Matrix 1 (3x4 matrix):

Enter sales value for Day 1, Product 1: 50
Enter sales value for Day 1, Product 2: 60
Enter sales value for Day 1, Product 3: 70
Enter sales value for Day 1, Product 4: 80
Enter sales value for Day 2, Product 1: 20
Enter sales value for Day 2, Product 2: 30
Enter sales value for Day 2, Product 3: 40
Enter sales value for Day 2, Product 4: 50
Enter sales value for Day 3, Product 1: 15
Enter sales value for Day 3, Product 2: 25
Enter sales value for Day 3, Product 3: 35
Enter sales value for Day 3, Product 4: 45

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 6

Enter sales values for Matrix 2 (3x4 matrix):

```
Enter your choice: 6
Enter sales values for Matrix 2 (3x4 matrix):
Enter sales value for Day 1, Product 1: 45
Enter sales value for Day 1, Product 2: 55
Enter sales value for Day 1, Product 3: 65
Enter sales value for Day 1, Product 4: 75
Enter sales value for Day 2, Product 1: 30
Enter sales value for Day 2, Product 2: 40
Enter sales value for Day 2, Product 3: 50
Enter sales value for Day 2, Product 4: 60
Enter sales value for Day 3, Product 1: 10
Enter sales value for Day 3, Product 2: 40
Enter sales value for Day 3, Product 3: 80
Enter sales value for Day 3, Product 4: 90
```

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

```
Enter your choice: 7
```

```
Matrix Addition Result:
```

```
  95  115  135  155
  50   70   90  110
  25   65  115  135
```

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 8

Matrix Subtraction Result:

5	5	5	5
-10	-10	-10	-10
5	-15	-45	-45

Pharmacy Management System & Matrix Operations

1. Add Medicine
2. Show All Medicines
3. Delete Medicine
4. Search Medicine by Name
5. Enter Sales Data (Matrix 1)
6. Enter Sales Data (Matrix 2)
7. Perform Matrix Addition
8. Perform Matrix Subtraction
9. Exit Program

Enter your choice: 9

Exiting the program.