**FNU Hassan**

**Assignment 3**

**GitHub Link:**

[*https://github.com/FNU-Hassan/Advance-Algorithm-Assignment-3*](https://github.com/FNU-Hassan/Advance-Algorithm-Assignment-3)

***#Program to Implement a LinkedList Implementation for Sparse Matrices***

// C++ program for sparse matrix representation.

// Using Link list

#include<iostream>

using namespace std;

// Node class to represent link list

class Node

{

public:

int row;

int col;

int data;

Node \*next;

};

// Function to create new node

void create\_new\_node(Node \*\*p, int row\_index,

int col\_index, int x)

{

Node \*temp = \*p;

Node \*r;

// If link list is empty then

// create first node and assign value.

if (temp == NULL)

{

temp = new Node();

temp->row = row\_index;

temp->col = col\_index;

temp->data = x;

temp->next = NULL;

\*p = temp;

}

// If link list is already created

// then append newly created node

else

{

while (temp->next != NULL)

temp = temp->next;

r = new Node();

r->row = row\_index;

r->col = col\_index;

r->data = x;

r->next = NULL;

temp->next = r;

}

}

// Function prints contents of linked list

// starting from start

void printList(Node \*start)

{

Node \*ptr = start;

cout << "row\_position:";

while (ptr != NULL)

{

cout << ptr->row << " ";

ptr = ptr->next;

}

cout << endl;

cout << "column\_position:";

ptr = start;

while (ptr != NULL)

{

cout << ptr->col << " ";

ptr = ptr->next;

}

cout << endl;

cout << "Value:";

ptr = start;

while (ptr != NULL)

{

cout << ptr->data << " ";

ptr = ptr->next;

}

}

// Driver Code

int main()

{

// 4x5 sparse matrix

int sparseMatrix[4][5] = { { 0 , 0 , 3 , 0 , 4 },

{ 0 , 0 , 5 , 7 , 0 },

{ 0 , 0 , 0 , 0 , 0 },

{ 0 , 2 , 6 , 0 , 0 } };

// Creating head/first node of list as NULL

Node \*first = NULL;

for(int i = 0; i < 4; i++)

{

for(int j = 0; j < 5; j++)

{

// Pass only those values which

// are non - zero

if (sparseMatrix[i][j] != 0)

create\_new\_node(&first, i, j,

sparseMatrix[i][j]);

}

}

printList(first);

return 0;

}

