MFG Assignment No: 05

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/* Floyd-Warshall algorithm:
Write a program for a city planner which needs to design a traffic system that minimizes the travel time between various intersections. Each road has a different travel time, and the planner wants to ensure that the shortest routes between all intersections are identified.
*/

```
#include<iostream>
#include<vector>
using namespace std;
//Warshall
void warshall(vector<vector<int>> &a, int n)
{
	int i,j,k;
	for(k=0;k<n;k++)
	{
		for(i=0;j<n;i++)
		{
			for(j=0;j<n;j++)
			{
				if(a[i][k]+a[k][j]<a[i][j])
				{
					a[i][j]=a[i][k]+a[k][j];

				}
			}
		}
	}
}
int main()
{
	int i,j;
```

```
        int m=4,n=4;
        vector<vector<int>> a(m,vector<int>(n));
        cout<<"\n Enter Matrix";
        for(i=0;i<n;i++)
        {
                for(j=0;j<n;j++)
                {
                        cin>>a[i][j];
                }
        }

        cout<<"\n Original Matrix is \n";
        for(i=0;i<n;i++)
        {
                for(j=0;j<n;j++)
                {
                        cout<<" "<<a[i][j];
                }
                cout<<"\n";
        }


  warshall(a,n);
  cout<<"\n Shortest path is \n";
        for(i=0;i<n;i++)
        {
                for(j=0;j<n;j++)
                {
                        cout<<" "<<a[i][j];
                }
                cout<<"\n";
        }

return 0;
}
```

Output:

```
Original Matrix is:
 5 7 3 INF
 3 0 INF 7
 3 9 0 INF
 0 1 INF 6

Shortest path matrix is:
 5 7 3 14
 3 0 6 7
 3 9 0 16
 0 1 3 6
```