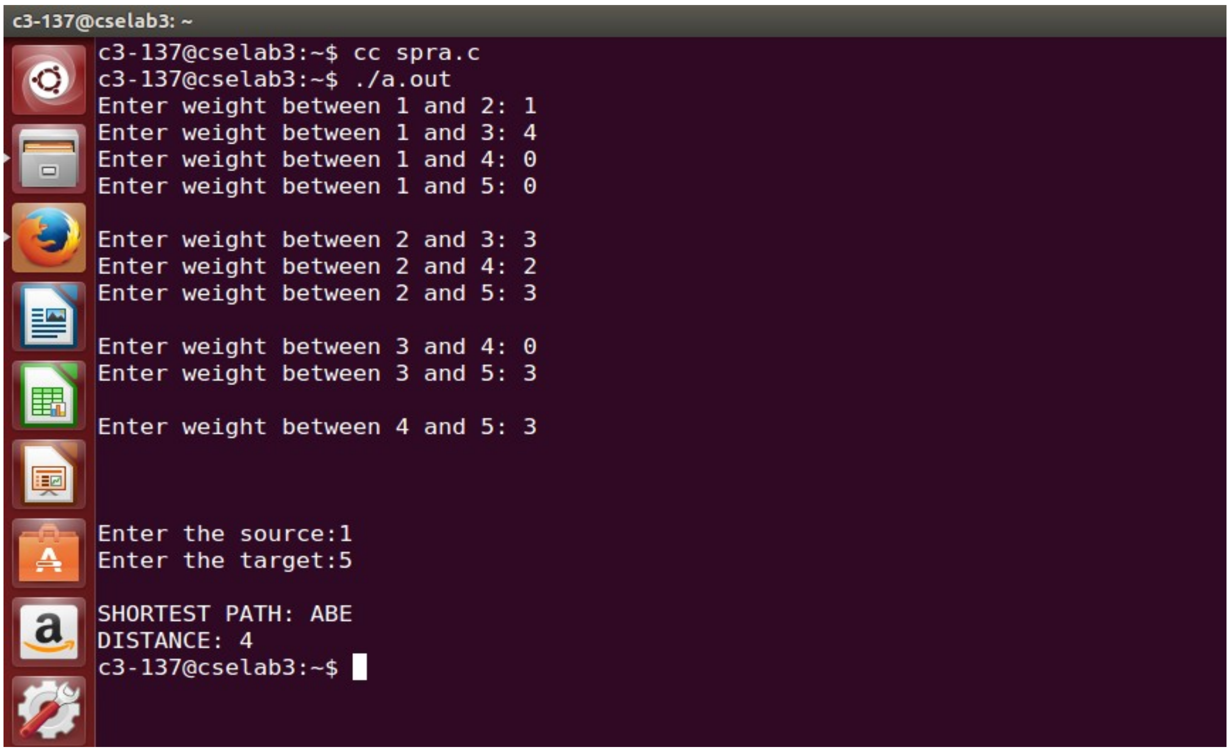
Dijkstra's Shortest Path Routing Algorithm

```
#include<stdio.h>
#include<string.h>
#include<math.h>
#define IN 99
#define N 6
int dijkstra(int cost[][N], int source, int target);
char *strrev(char*);

int main()
{
	int cost[N][N], i, j, w, ch, co;
	int x, y, source, target;
	int s, t;
	for(i = 1; i < N; i++)
		for(j = 1; j < N; j++)
			cost[i][j] = IN;
	for(x = 1; x < N; x++)
	{
		for(y = x+1; y < N; y++)
		{
			printf("Enter weight between %d and %d: ", x, y);
			scanf("%d", &w);
			if(w==0)	w = IN;
			cost[x][y] = cost [y][x] = w;
		}
		printf("\n");
	}
	printf("\nEnter the source:");
	scanf("%d", &source);
	printf("Enter the target:");
	scanf("%d", &target);
	co = dijkstra(cost, source, target);
	printf("\nDISTANCE: %d\n", co);
}

int dijkstra(int cost[][N], int source, int target)
{
	int dist[N], prev[N], selected[N] = {0}, i, m, min, start, d, j;
	char path[N];
	for(i = 1; i < N; i++)
	{
		dist[i] = IN;
		prev[i] = -1;
	}

	start = source;
	selected[start] = 1;
	dist[start] = 0;
	while(selected[target]==0)
	{
		min = IN;
		m = 0;
		for(i = 1; i < N; i++)
		{
			d = dist[start] + cost[start][i];
			if(d< dist[i]&&selected[i]==0)
			{
				dist[i] = d;
				prev[i] = start;
			}
			if(min>dist[i] && selected[i]==0)
```

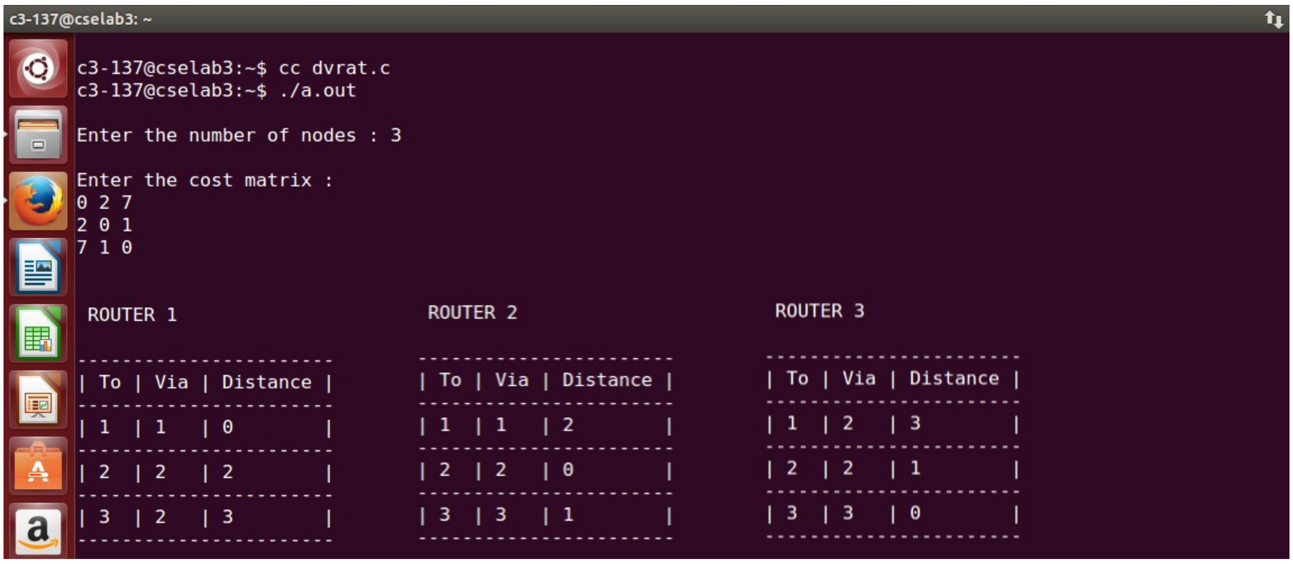
```
                        {
                                min = dist[i];
                                m = i;
                        }
                }
                start = m;
                selected[start] = 1;
        }
        start = target;
        j = 0;
        while(start != -1)
        {
                path[j++] = start+64;
                start = prev[start];
        }
        path[j]='\0';
        strrev(path);
        printf("\nSHORTEST PATH: %s", path);
        return dist[target];
}


char *strrev(char *str)
{
      char *p1, *p2;

      if (! str || ! *str)
            return str;
      for (p1 = str, p2 = str + strlen(str) - 1; p2 > p1; ++p1, --p2)
      {
            *p1 ^= *p2;
            *p2 ^= *p1;
            *p1 ^= *p2;
      }
      return str;
}
```



```
c3-137@cselab3: ~
c3-137@cselab3:~$ cc spra.c
c3-137@cselab3:~$ ./a.out
Enter weight between 1 and 2: 1
Enter weight between 1 and 3: 4
Enter weight between 1 and 4: 0
Enter weight between 1 and 5: 0

Enter weight between 2 and 3: 3
Enter weight between 2 and 4: 2
Enter weight between 2 and 5: 3

Enter weight between 3 and 4: 0
Enter weight between 3 and 5: 3

Enter weight between 4 and 5: 3



Enter the source:1
Enter the target:5

SHORTEST PATH: ABE
DISTANCE: 4
c3-137@cselab3:~$
```

Bellman-Ford Distance Vector Routing Algorithm

```
#include<stdio.h>
struct node
{
        unsigned dist[20];
        unsigned from[20];
}rt[10];

int main()
{
        int costmat[20][20];
        int nodes,i,j,k,count=0;
        printf("\nEnter the number of nodes : ");
        scanf("%d",&nodes);
        printf("\nEnter the cost matrix :\n");
        for(i=0;i<nodes;i++)
        {
                for(j=0;j<nodes;j++)
                {
                        scanf("%d",&costmat[i][j]);
                        costmat[i][i]=0;
                        rt[i].dist[j]=costmat[i][j];
                        rt[i].from[j]=j;
                }
        }

        do
        {
                count=0;
                for(i=0;i<nodes;i++)
                        for(j=0;j<nodes;j++)
                                for(k=0;k<nodes;k++)
                                        if(rt[i].dist[j]>costmat[i][k]
+rt[k].dist[j])
                                        {
                                                rt[i].dist[j]=rt[i].dist[k]
+rt[k].dist[j];

                                                rt[i].from[j]=k;
                                                count++;
                                        }
        }while(count!=0);

        for(i=0;i<nodes;i++)
        {
                printf("\n\n ROUTER %d\n",i+1);
                printf("\n----------------------");
                printf("\n| To | Via | Distance |");
                for(j=0;j<nodes;j++)
                {
                        printf("\n----------------------");
                        printf("\t\n| %d  | %d   | %d\t
|",j+1,rt[i].from[j]+1,rt[i].dist[j]);
                }
                printf("\n----------------------");
        }

        printf("\n\n");
        return 0;
}
```



```
c3-137@cselab3:~$ cc dvrat.c
c3-137@cselab3:~$ ./a.out

Enter the number of nodes : 3

Enter the cost matrix :
0 2 7
2 0 1
7 1 0

 ROUTER 1                      ROUTER 2                      ROUTER 3

----------------------      ----------------------      ----------------------
| To | Via | Distance |      | To | Via | Distance |      | To | Via | Distance |
----------------------      ----------------------      ----------------------
| 1  | 1   | 0        |      | 1  | 1   | 2        |      | 1  | 2   | 3        |
----------------------      ----------------------      ----------------------
| 2  | 2   | 2        |      | 2  | 2   | 0        |      | 2  | 2   | 1        |
----------------------      ----------------------      ----------------------
| 3  | 2   | 3        |      | 3  | 3   | 1        |      | 3  | 3   | 0        |
----------------------      ----------------------      ----------------------
```