

# Programming 3-9: 图上的游走

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## 1 Problem 3-9-A: 抠门的龙

### 1.1 代码样例

```
1 #include <stdio.h>
2 #include <cstring>
3 using namespace std;
4 #define N 100006
5 int n,in[28],out[28],d[28],adj[28][28],vis[28];
6
7 void dfs(int x){
8     vis[x]=1;
9     for(int i=1;i<=26;i++){
10         if(adj[x][i]&&!vis[i]){
11             dfs(i);
12         }
13     }
14 }
15
16
17 int main(){
18     memset(vis,0,sizeof(vis));
19     memset(adj,0,sizeof(adj));
20     memset(in,0,sizeof(in));
21     memset(out,0,sizeof(out));
22     scanf("%d",&n);
23     getchar();
24     char a,b;
25     int temp;
26     for (int i=1;i<=n;i++){
27         scanf("%c",&a);
28         temp=a-96;
29         in[temp]++;
30         while(a!='\n'){
31             b=a;
32             scanf("%c",&a);
33         }
34         out[b-96]++;
35         adj[temp][b-96]=1;
36         adj[b-96][temp]=1;
37     }
38     dfs(temp);
```

```
39  for(int i=1;i<=26;i++){
40      if(!vis[i]&&(in[i]||out[i])){
41          printf("Nothing\n");
42          return 0;
43      }
44  }
45  int flag=0,diff=0,odd=0;
46  for(int i=1;i<=26;i++){
47      d[i]=in[i]+out[i];
48      if(d[i]%2) odd++;
49      if(in[i]==out[i]) continue;
50      else if(in[i]==out[i]+1){
51          diff++;flag++;
52      }
53      else if(in[i]==out[i]-1){
54          diff--;flag++;
55      }
56      else flag+=100;
57  }
58  if(!diff&&flag<3){
59      printf("Gold\n");
60  }
61  else if(odd==2||!odd){
62      printf("Silver\n");
63  }
64  else printf("Nothing\n");
65  }
66 }
67 /*****
68 Problem: 1567
69 User: 171860538
70 Language: C++
71 Result: 正确
72 Time:24 ms
73 Memory:964 kb
74 *****/
```

Listing 1: A by 171860538

## 2 Problem 3-9-B: 关于我转生成为史莱姆的那件事

### 2.1 代码样例

```
1 #include <iostream>
2 #include <vector>
3 #define MAX 21
4 using namespace std;
5
6 int deg[MAX];
7 vector<int> adj[MAX];
8 vector<int> path;
9 bool edge_vis[MAX][MAX];
10 bool vis[MAX];
11
12 bool dfs(int x, int left) {
13     if (left == 1) return true;
14     vis[x] = true;
15     for (int i = 0; i < adj[x].size(); i++) {
16         int y = adj[x][i];
17         if (!vis[y]) {
18             if (dfs(y, left - 1)) return true;
19         }
20     }
21     vis[x] = false;
22     return false;
23 }
24
25 bool dfs2(int x, int left) {
26     if (left == 0) {
27         path.push_back(x);
28         return true;
29     }
30     for (int i = 0; i < adj[x].size(); i++) {
31         int y = adj[x][i];
32         if (!edge_vis[x][y]) {
33             edge_vis[x][y] = edge_vis[y][x] = true;
34             if (dfs2(y, left - 1)) {
35                 path.push_back(x);
36                 return true;
37             }
38             edge_vis[x][y] = edge_vis[y][x] = false;
39         }
40     }
41     return false;
42 }
43
44 int main() {
45     int n, m;
46     int a, b;
47     scanf("%d%d", &n, &m);
48     for (int i = 1; i <= n; i++) {
49         vis[i] = 0;
50     }
51     for (int i = 1; i <= m; i++) {
```

```

52     scanf("%d%d", &a, &b);
53     deg[a] ++;
54     deg[b] ++;
55     adj[a].push_back(b);
56     adj[b].push_back(a);
57 }
58 bool hamil = false;
59 for(int i = 1; i <= n; i++) {
60     if(dfs(i, n)) {
61         hamil = true;
62         break;
63     }
64 }
65 if(!hamil){
66     printf("Miss Shizue\n");
67     return 0;
68 }
69
70 int odd = 0;
71 for(int i = 1; i <= n; i++) {
72     if(deg[i] & 1) odd ++;
73 }
74 if(odd != 0){
75     printf("Miss Leon");
76     return 0;
77 }
78
79 for(int i = 1; i <= n; i++) {
80     if(dfs2(i, m)) {
81         printf("Find Leon\n");
82         for(int j = 0; j < m ; j++){
83             printf("%d %d\n", path[j], path[j + 1]);
84         }
85         break;
86     }
87 }
88 return 0;
89 }
90 /*****
91 Problem: 1568
92 User: 171240502
93 Language: C++
94 Result: 正确
95 Time:0 ms
96 Memory:1552 kb
97 *****/

```

Listing 2: B by 171240502

### 3 Problem 3-9-C: 桐人，爱丽丝又被最高祭司抓走啦

#### 3.1 代码样例

```

1  #include <cstdio>
2  #include <cstring>
3  #include <iostream>
4  using namespace std;
5
6  #define maxn 1010
7  bool graph[maxn][maxn];
8  int nextn[maxn];
9  int head, n;
10 char str[maxn << 1];
11
12 int main() {
13     int i, j, k;
14     scanf("%d\n", &n);
15     int T=1;
16     while(T--){
17         for(i = 0; i < n; i++) {
18             gets(str);
19             for(j = 0; j < n; j++)
20                 graph[i][j] = str[j << 1] - '0';
21         }
22         memset(nextn, 0xff, sizeof(nextn));
23         head = 0;
24         for(i = 1; i < n; i++) {
25             if(graph[i][head]) {
26                 nextn[i] = head; head = i;
27                 continue;
28             }
29             j = head; k = nextn[j];
30             while(k != -1) {
31                 if(graph[j][i] && graph[i][k]) break;
32                 j = k; k = nextn[j];
33             }
34             nextn[i] = k;
35             nextn[j] = i;
36         }
37         printf("%d\n", n);
38         for(i = 0; i < n; i++) {
39             printf(i == 0 ? "%d" : " %d", head + 1);
40             head = nextn[head];
41         }
42         cout<<" -1";
43         printf("\n");
44     }
45     return 0;
46 }
47 /*****
48 Problem: 1569
49 User: 171860609
50 Language: C++
51 Result: 正确

```

```
52 Time:8 ms
53 Memory:2552 kb
54 *****/
```

Listing 3: C by 171860609

## 4 Problem 3-8-A: 最靓的崽

## 4.1 代码样例

```

1  #include <cstdio>
2  #include <queue>
3  #include <algorithm>
4  #include <cstring>
5  #include <string>
6  using namespace std;
7
8  const int maxn = 15+1;
9  const int maxm = 1<<maxn;
10 struct node
11 {
12     int pos;
13     int dist;
14     node(int pos,int dist)
15     {
16         this->pos = pos;
17         this->dist = dist;
18     }
19
20     friend bool operator < (const node &a,const node &b)
21     {
22         return a.dist > b.dist;
23     }
24 };
25
26 int d[maxn],edge[maxn][maxn],dis[maxm];
27 bool vis[maxm];
28 int n, m, st, ed, sum;
29
30 void dijkstra()
31 {
32     priority_queue<node> Q;
33     int up = 1 << n;
34     for(int i = 0; i< up;i++)
35     {
36         dis[i] = -1;
37         vis[i] = false;
38     }
39     dis[st] = sum;
40     Q.push(node(st,dis[st]));
41     while(!Q.empty())
42     {
43         node ans = Q.top();
44         Q.pop();
45         int u = ans.pos;
46         if(vis[u]) continue;
47         vis[u] = true;
48         if(u == ed) break;
49         for(int i = 0; i < n; i++)
50         {
51             for(int j = 0;j < i; j++)

```

```

52     {
53         if(edge[i][j] != -1)
54         {
55             int v = u ^ (1<<i);
56             v = v ^ (1<<j);
57             if(dis[v] == -1 || dis[u] + edge[i][j] < dis[v])
58             {
59                 dis[v] = dis[u] + edge[i][j];
60                 Q.push(node(v, dis[v]));
61             }
62         }
63     }
64 }
65 }
66 }
67
68 int main() {
69     scanf("%d %d", &n, &m);
70     for (int i = 0; i < n; i++) {
71         d[i] = 0;
72         for (int j = 0; j < n; j++)
73             edge[i][j] = -1;
74     }
75     int a, b, c;
76     sum = 0;
77     for (int i = 0; i < m; i++) {
78         scanf("%d%d%d", &a, &b, &c);
79         a--, b--;
80         d[a]++;
81         d[b]++;
82         sum += c;
83         if (edge[a][b] == -1 || edge[a][b] > c)
84             edge[a][b] = edge[b][a] = c;
85     }
86     st = ed = 0;
87     for (int i = 0; i < n; i++) {
88         ed |= (1 << i);
89         if (d[i] % 2 == 0)
90             st |= (1 << i);
91     }
92     dijkstra();
93     printf("%d\n", dis[ed]);
94     return 0;
95 }
96
97 /*****
98 Problem: 1570
99 User: 171870691
100 Language: C++
101 Result: 正确
102 Time:64 ms
103 Memory:2168 kb
104 *****/

```

Listing 4: D by 171870691



```

1  #include <iostream>
2  #include <cstring>
3
4  using namespace std;
5  const int INF=0x7ffff;
6  int dp[1<<16],du[16];
7  int map[16][16];
8  int n,m,sum=0;
9  int st=0;
10
11 inline void Insert(int x,int y,int z){
12     if(z<map[x][y]) map[x][y]=map[y][x]=z;
13     du[x]++;
14     du[y]++;
15     sum+=z;
16 }
17
18 void floyd(){
19     for(int k=0;k<n;k++)
20         for(int i=0;i<n;i++)
21             for(int j=0;j<n;j++)
22                 map[i][j] = min(map[i][j], map[i][k] + map[k][j]);
23 }
24
25 int dpsol(int st){
26     if(st==0) return 0;
27     if(dp[st]) return dp[st];
28     int ans=INF;
29     for(int i=0;i<n-1;i++)
30         if(st&(1<<i))
31             for(int j=i+1;j<n;j++)
32                 if(st&(1<<j))
33                     ans=min(ans,dpsol(st-(1<<i)-(1<<j))+map[i][j]);
34     return dp[st]=ans;
35 }
36
37 int main(){
38     scanf("%d%d",&n,&m);
39     int a,b,c;
40     memset(du,0,sizeof(du));
41     memset(dp,0,sizeof(dp));
42     for(int i=0;i<n;i++)
43         for(int j=0;j<n;j++)
44             map[i][j]=INF;
45     for(int i=0;i<m;i++){
46         scanf("%d%d%d",&a,&b,&c);
47         Insert(a-1,b-1,c);
48     }
49     floyd();
50     for(int i=0;i<n;i++)
51         if(du[i]%2==1)
52             st=st|(1<<i);
53
54     printf("%d\n",sum+dpsol(st));
55     return 0;
56 }

```

```
57 /*****
58 Problem: 1570
59 User: 171240537
60 Language: C++
61 Result: 正确
62 Time:12 ms
63 Memory:1804 kb
64 *****/
```

Listing 5: D by 171870691