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

```
#include <stdio.h>
#include <cstring>
using namespace std;
#define N 100006
int n,in[28],out[28],d[28],adj[28][28], vis[28];

void dfs(int x){
    vis[x]=1;
    for(int i=1;i<=26;i++){
        if(adj[x][i]&&!vis[i]){
            dfs(i);
        }
    }
}


int main(){
    memset(vis,0,sizeof(vis));
    memset(adj,0,sizeof(adj));
    memset(in,0,sizeof(in));
    memset(out,0,sizeof(out));
    scanf("%d",&n);
    getchar();
    char a,b;
    int temp;
    for (int i=1;i<=n;i++){
        scanf("%c",&a);
        temp=a-96;
        in[a-96]++;
        while(a!='\n'){
            b=a;
            scanf("%c",&a);
        }
        out[b-96]++;
        adj[temp][b-96]=1;
        adj[b-96][temp]=1;
    }
    dfs(temp);
```

```
    for(int i=1;i<=26;i++){
        if(!vis[i]&&(in[i]||out[i])){
            printf("Nothing\n");
            return 0;
        }
    }
    int flag=0,diff=0,odd=0;
    for(int i=1;i<=26;i++){
        d[i]=in[i]+out[i];
        if(d[i]%2) odd++;
        if(in[i]==out[i]) continue;
        else if(in[i]==out[i]+1){
            diff++;flag++;
        }
        else if(in[i]==out[i]-1){
            diff--;flag++;
        }
        else flag+=100;
    }
    if(!diff&&flag<3){
        printf("Gold\n");
    }
    else if(odd==2||!odd){
        printf("Silver\n");
    }
    else printf("Nothing\n");

}
/**************************************************************
    Problem: 1567
    User: 171860538
    Language: C++
    Result: 正确
    Time:24 ms
    Memory:964 kb
**************************************************************/
```

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

```
#include <iostream>
#include <vector>
#define MAX 21
using namespace std;

int deg[MAX];
vector<int> adj[MAX];
vector<int> path;
bool edge_vis[MAX][MAX];
bool vis[MAX];

bool dfs(int x, int left) {
    if(left == 1)return true;
    vis[x] = true;
    for(int i = 0; i < adj[x].size(); i ++) {
        int y = adj[x][i];
        if(!vis[y]) {
            if(dfs(y, left - 1)) return true;
        }
    }
    vis[x] = false;
    return false;
}

bool dfs2(int x, int left) {
    if(left == 0){
        path.push_back(x);
        return true;
    }
    for(int i = 0; i < adj[x].size(); i ++) {
        int y = adj[x][i];
        if(!edge_vis[x][y]) {
            edge_vis[x][y] = edge_vis[y][x] = true;
            if(dfs2(y, left - 1)) {
                path.push_back(x);
                return true;
            }
            edge_vis[x][y] = edge_vis[y][x] = false;
        }
    }
    return false;
}

int main() {
    int n, m;
    int a, b;
    scanf("%d%d", &n, &m);
    for(int i = 1; i <= n; i ++) {
        vis[i] = 0;
    }
    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

```
#include <cstdio>
#include <cstring>
#include<iostream>
using namespace std;

#define maxn 1010
bool graph[maxn][maxn];
int nextn[maxn];
int head, n;
char str[maxn << 1];

int main() {
    int i, j, k;
    scanf("%d\n", &n);
    int T=1;
    while(T--){
        for(i = 0; i < n; i ++) {
            gets(str);
            for(j = 0; j < n; j ++)
                graph[i][j] = str[j << 1] - '0';
        }
        memset(nextn, 0xff, sizeof(nextn));
        head = 0;
        for(i = 1; i < n; i++) {
            if(graph[i][head]) {
                nextn[i] = head; head = i;
                continue;
            }
            j = head; k = nextn[j];
            while(k != -1) {
                if(graph[j][i] && graph[i][k]) break;
                j = k; k = nextn[j];
            }
            nextn[i] = k;
            nextn[j] = i;
        }
        printf("%d\n", n);
        for(i = 0; i < n; i++) {
            printf(i == 0 ? "%d" : " %d", head + 1);
            head = nextn[head];
        }
        cout<<" -1";
        printf("\n");
    }
    return 0;
}
/**************************************************************
    Problem: 1569
    User: 171860609
    Language: C++
    Result: 正确
```

```
    Time:8 ms
    Memory:2552 kb
**************************************************************/
```

Listing 3: C by 171860609

4 Problem 3-8-A: 最靓的崽

4.1 代码样例

```
#include <cstdio>
#include <queue>
#include <algorithm>
#include <cstring>
#include <string>
using namespace std;

const int maxn = 15+1;
const int maxm = 1<<maxn;
struct node
{
    int pos;
    int dist;
    node(int pos,int dist)
    {
        this->pos = pos;
        this->dist = dist;
    }

    friend bool operator < (const node &a,const node &b)
    {
        return a.dist > b.dist;
    }
};

int d[maxn],edge[maxn][maxn],dis[maxm];
bool vis[maxm];
int n, m, st, ed, sum;

void dijkstra()
{
    priority_queue<node> Q;
    int up = 1 << n;
    for(int i = 0; i< up;i++)
    {
        dis[i] = -1;
        vis[i] = false;
    }
    dis[st] = sum;
    Q.push(node(st,dis[st]));
    while(!Q.empty())
    {
        node ans = Q.top();
        Q.pop();
        int u = ans.pos;
        if(vis[u]) continue;
        vis[u] = true;
        if(u == ed) break;
        for(int i = 0; i <n; i++)
        {
            for(int j = 0;j < i; j++)
```

```
            {
                if(edge[i][j] != -1)
                {
                    int v = u ^ (1<<i);
                    v = v ^ (1<<j);
                    if(dis[v] == -1 || dis[u] + edge[i][j] < dis[v])
                    {
                        dis[v] = dis[u] + edge[i][j];
                        Q.push(node(v, dis[v]));
                    }
                }
            }
        }
    }
}

int main() {
    scanf("%d %d", &n, &m);
    for (int i = 0; i < n; i++) {
        d[i] = 0;
        for (int j = 0; j < n; j++)
            edge[i][j] = -1;
    }
    int a, b, c;
    sum = 0;
    for (int i = 0; i < m; i++) {
        scanf("%d%d%d", &a, &b, &c);
        a--, b--;
        d[a]++;
        d[b]++;
        sum += c;
        if (edge[a][b] == -1 || edge[a][b] > c)
            edge[a][b] = edge[b][a] = c;
    }
    st = ed = 0;
    for (int i = 0; i < n; i++) {
        ed |= (1 << i);
        if (d[i] % 2 == 0)
            st |= (1 << i);
    }
    dijkstra();
    printf("%d\n", dis[ed]);
    return 0;
}

/**************************************************************
    Problem: 1570
    User: 171870691
    Language: C++
    Result: 正确
    Time:64 ms
    Memory:2168 kb
****************************************************************/
```

Listing 4: D by 171870691

```cpp
#include <iostream>
#include <cstring>

using namespace std;
const int INF=0x7fffff;
int dp[1<<16],du[16];
int map[16][16];
int n,m,sum=0;
int st=0;

inline void Insert(int x,int y,int z){
    if(z<map[x][y]) map[x][y]=map[y][x]=z;
    du[x]++;
    du[y]++;
    sum+=z;
}

void floyd(){
    for(int k=0;k<n;k++)
        for(int i=0;i<n;i++)
            for(int j=0;j<n;j++)
                map[i][j] = min(map[i][j], map[i][k] + map[k][j]);
}

int dpsol(int st){
    if(st==0) return 0;
    if(dp[st]) return dp[st];
    int ans=INF;
    for(int i=0;i<n-1;i++)
        if(st&(1<<i))
            for(int j=i+1;j<n;j++)
                if(st&(1<<j))
                    ans=min(ans,dpsol(st-(1<<i)-(1<<j))+map[i][j]);
    return dp[st]=ans;
}

int main(){
    scanf("%d%d",&n,&m);
    int a,b,c;
    memset(du,0,sizeof(du));
    memset(dp,0,sizeof(dp));
    for(int i=0;i<n;i++)
        for(int j=0;j<n;j++)
            map[i][j]=INF;
    for(int i=0;i<m;i++){
        scanf("%d%d%d",&a,&b,&c);
        Insert(a-1,b-1,c);
    }
    floyd();
    for(int i=0;i<n;i++)
        if(du[i]%2==1)
            st=st|(1<<i);

    printf("%d\n",sum+dpsol(st));
    return 0;
}
```

```
/**************************************************************
    Problem: 1570
    User: 171240537
    Language: C++
    Result: 正确
    Time:12 ms
    Memory:1804 kb
****************************************************************/
```

Listing 5: D by 171870691