MÃ CHƯƠNG TRÌNH

BÀI TOÁN QUAN HỆ GIA ĐÌNH

```cpp
#include <fstream.h>
#include <string.h>
#include <conio.h>
#include <stdio.h>

class Nguoi
{
    friend class Nam;
    friend class Nu;

    static Nguoi* NhanDan[100];
    static int SoDan;

    char Ten[25];
    Nam *Bo;
    Nu *Me;
    Nguoi *AnhChi[10], *CacEm[10], *CacCon[10];
    int SoAnhChi, SoEm, SoCon;

    Nguoi(char *ten, Nam *bo, Nu *me) :
        Bo(bo), Me(me), SoAnhChi(0), SoEm(0), SoCon(0)
    {
        strcpy(Ten, ten);
    }

    void ThemAnhChi(Nguoi* nguoi)
```

```
        {
            AnhChi[SoAnhChi++] = nguoi;
        }
        void ThemEm(Nguoi* nguoi)
        {
            CacEm[SoEm++] = nguoi;
        }
        void ThemCon(Nguoi* nguoi)
        {
            CacCon[SoCon++] = nguoi;
        }


public:

        static int LaySoDan() { return SoDan; }
        static Nguoi* ThemDan(Nguoi* nguoi)
        {
            return NhanDan[SoDan++] = nguoi;
        }
        static Nguoi* TaoNguoi(char* ten, int gioitinh, Nam *bo=0, Nu *me=0);
        static Nguoi* TimNguoi(char* ten);
        static void XoaDuLieu();


        virtual int GioiTinh()=0;
        virtual int Cuoi(Nguoi*)=0;


        int LaCha(Nguoi *);
        int LaMe(Nguoi *);
        int LaCon(Nguoi *);
        int LaAnh(Nguoi *);
        int LaChi(Nguoi *);
        int LaEm(Nguoi *);
```

```cpp
    int LaCo(Nguoi *);
    int LaDi(Nguoi *);
    int LaChu(Nguoi *);
    int LaCau(Nguoi *);
    int LaMo(Nguoi *);
    int LaBac(Nguoi *);
    int LaOngNoi(Nguoi *);
    int LaBaNoi(Nguoi *);
    int LaOngNgoai(Nguoi *);
    int LaBaNgoai(Nguoi *);
    int LaAnhHo(Nguoi *);
    int LaChiHo(Nguoi *);
    int LaEmHo(Nguoi *);

    virtual int LaVo(Nguoi*)=0;
    virtual int LaChong(Nguoi*)=0;

    char* LayTen() { return Ten; }
};

Nguoi* Nguoi::NhanDan[];
int Nguoi::SoDan = 0;

class Nam : public Nguoi
{
    Nu *Vo;

    int LaVo(Nguoi *) { return 0; }

public:

    Nam(char *ten, Nam *bo=0, Nu *me=0) : Nguoi(ten, bo, me), Vo(0) {}
```

```
    int GioiTinh() { return 1; }

    int Cuoi(Nguoi *vo);

    int LaChong(Nguoi * nguoi);
};

class Nu : public Nguoi
{
    Nam *Chong;

    int LaChong(Nguoi *) { return 0; }

public:

    Nu(char *ten, Nam *bo=0, Nu *me=0) : Nguoi(ten, bo, me), Chong(0) {}

    int GioiTinh() { return 0; }

    int Cuoi(Nguoi *chong);

    void SinhCon(char* ten, int gioitinh);

    int LaVo(Nguoi * nguoi);
};

Nguoi* Nguoi::TaoNguoi(char* ten, int gioitinh, Nam *bo, Nu *me)
{
    return gioitinh ? ThemDan(new Nam(ten, bo, me)) : ThemDan(new Nu(ten, bo,
me));
}
```

```
Nguoi* Nguoi::TimNguoi(char* ten)
{
    for (int i=0; i<SoDan; i++)
        if (strcmp(ten, NhanDan[i]->LayTen())==0) return NhanDan[i];
    return 0;
}

void Nguoi::XoaDuLieu()
{
    for (int i=0; i<SoDan; i++)
        delete NhanDan[i];
    SoDan = 0;
}

inline int Nguoi::LaCha(Nguoi *nguoi)
{
    return nguoi->Bo==this;
}
inline int Nguoi::LaMe(Nguoi *nguoi)
{
    return nguoi->Me==this;
}
int Nguoi::LaCon(Nguoi *nguoi)
{
    return nguoi->LaCha(this)||nguoi->LaMe(this);
}
int Nguoi::LaAnh(Nguoi *nguoi)
{
    if (GioiTinh()==0) return 0;
    return nguoi->LaEm(this);
}
```

```
int Nguoi::LaChi(Nguoi *nguoi)
{
    if (GioiTinh()) return 0;
    return nguoi->LaEm(this);
}
int Nguoi::LaEm(Nguoi *nguoi)
{
    for (int i=0; i<SoAnhChi; i++)
        if (AnhChi[i]==nguoi) return 1;
    return 0;
}
int Nguoi::LaCo(Nguoi *nguoi)
{
    if (GioiTinh()) return 0;
    for (int i=0; i<SoDan; i++)
    {
        if (NhanDan[i]->LaAnh(this)&&NhanDan[i]->LaCha(nguoi)) return 1;
    }
    return 0;
}
int Nguoi::LaDi(Nguoi *nguoi)
{
    if (GioiTinh()) return 0;
    for (int i=0; i<SoDan; i++)
        if (NhanDan[i]->LaChi(this)&&NhanDan[i]->LaMe(nguoi)) return 1;
    return 0;
}
int Nguoi::LaChu(Nguoi *nguoi)
{
    if (GioiTinh()==0) return 0;
    for (int i=0; i<SoDan; i++)
        if (LaEm(NhanDan[i])&&NhanDan[i]->LaCha(nguoi)) return 1;
```

```
    return 0;
}
int LaCau(Nguoi *nguoi)
{
    if (GioiTinh()==0) return 0;
    for (int i=0; i<SoDan; i++)
        if (LaEm(NhanDan[i])&&NhanDan[i]->LaMe(nguoi)) return 1;
    return 0;
}
int LaMo(Nguoi *nguoi)
{
    if (GioiTinh()) return 0;
    for (int i=0; i<SoDan; i++)
        if (LaVo(NhanDan[i])&&NhanDan[i]->LaCau(nguoi)) return 1;
    return 0;
}
int Nguoi::LaBac(Nguoi *nguoi)
{
    for (int i=0; i<SoDan; i++)
        if (NhanDan[i]->LaEm(this)&&nguoi->LaCon(NhanDan[i])) return 1;
    return 0;
}
int Nguoi::LaOngNoi(Nguoi *nguoi)
{
    if (GioiTinh()==0) return 0;
    for (int i=0; i<SoDan; i++)
        if (LaCha(NhanDan[i])&&NhanDan[i]->LaCha(nguoi)) return 1;
    return 0;
}
int Nguoi::LaBaNoi(Nguoi *nguoi)
{
    if (GioiTinh()) return 0;
```

```
        for (int i=0; i<SoDan; i++)
            if (LaMe(NhanDan[i])&&NhanDan[i]->LaCha(nguoi)) return 1;
        return 0;
}
int Nguoi::LaOngNgoai(Nguoi *nguoi)
{
        if (GioiTinh()==0) return 0;
        for (int i=0; i<SoDan; i++)
            if (LaCha(NhanDan[i])&&NhanDan[i]->LaMe(nguoi)) return 1;
        return 0;
}
int Nguoi::LaBaNgoai(Nguoi *nguoi)
{
        if (GioiTinh()) return 0;
        for (int i=0; i<SoDan; i++)
            if (LaMe(NhanDan[i])&&NhanDan[i]->LaMe(nguoi)) return 1;
        return 0;
}
int Nguoi::LaAnhHo(Nguoi *nguoi)
{
        if (GioiTinh()==0) return 0;
        return nguoi->LaEmHo(this);
}
int Nguoi::LaChiHo(Nguoi *nguoi)
{
        if (GioiTinh()) return 0;
        return nguoi->LaEmHo(this);
}
int Nguoi::LaEmHo(Nguoi *nguoi)
{
        for (int i=0; i<SoDan; i++)
            if ( LaCon(NhanDan[i])&&(NhanDan[i]->LaChu(nguoi)
```

```
                    ||NhanDan[i]->LaDi(nguoi)||NhanDan[i]->LaCo(nguoi)) ) return
1;
    return 0;
}


int Nam::Cuoi(Nguoi *vo)
{
    if (Vo||vo->GioiTinh()) return 0;
    Vo = (Nu*)vo;
    Vo->Cuoi(this);
    return 1;
}


inline int Nam::LaChong(Nguoi *nguoi) { return Vo==nguoi; }


int Nu::Cuoi(Nguoi *chong)
{
    if (Chong||chong->GioiTinh()==0) return 0;
    Chong = (Nam*)chong;
    Chong->Cuoi(this);
    return 1;
}


void Nu::SinhCon(char *ten, int gioitinh)
{
    Nguoi* nguoi = TaoNguoi(ten, gioitinh, Chong, this);
    ThemCon(nguoi);
    if (Chong) Chong->ThemCon(nguoi);
    for (int i=0; i<SoCon; i++)
    {
        CacCon[i]->ThemEm(nguoi);
        nguoi->ThemAnhChi(CacCon[i]);
```

```
    }
}

inline int Nu::LaVo(Nguoi *nguoi) { return Chong==nguoi; }

char qh[256];

char* QuanHe(Nguoi* A, Nguoi* B)
{
    for (int i=1; i<=2; i++)
    {
        strcpy(qh, A->LayTen());
        strcat(qh, " va ");
        strcat(qh, B->LayTen());
        strcat(qh, " co quan he ");
        if (A->LaOngNoi(B))
            return strcat(qh, "ong chau noi");
        if (A->LaBaNoi(B))
            return strcat(qh, "ba chau noi");
        if (A->LaOngNgoai(B))
            return strcat(qh, "ong chau ngoai");
        if (A->LaBaNgoai(B))
            return strcat(qh, "ba chau ngoai");
        if (A->LaCha(B))
            return strcat(qh, "cha con");
        if (A->LaMe(B))
            return strcat(qh, "me con");
        if (A->LaCo(B))
            return strcat(qh, "co chau");
        if (A->LaDi(B))
            return strcat(qh, "di chau");
        if (A->LaChu(B))
```

```
            return strcat(qh, "chu chau");
        if (A->LaBac(B))
            return strcat(qh, "bac chau");
        if (A->LaAnh(B))
            return strcat(qh, "anh em");
        if (A->LaChi(B))
            return strcat(qh, "chi em");
        if (A->LaAnhHo(B))
            return strcat(qh, "anh em ho");
        if (A->LaChiHo(B))
            return strcat(qh, "chi em ho");
        if (A->LaVo(B))
            return strcat(qh, "vo chong");

        Nguoi* temp = A;
        A = B;
        B = temp;
    }
    strcpy(qh, A->LayTen());
    strcat(qh, " va ");
    strcat(qh, B->LayTen());
    return strcat(qh, " khong co quan he gia dinh");
}


// thu tuc nhap du lieu tu tep de tao cay gia dinh
void NhapDuLieu()
{
    clrscr();
    char s[80];
    cout << "Ten tep nhap du lieu: ";
    cin >> s;
```

```
ifstream input(s, ios::in|ios::nocreate);
input.seekg(0L, ios::end);
if ( input.tellg() < 0)
{
    cout << "Loi mo tep ! \n";
    getch();
    return;
}
input.seekg(0L, ios::beg);

cout << "Dang nhap du lieu.........\n";
int dong = 1;
while (1)
{
    input.getline(s, sizeof(s));
    if (input.gcount()==0) break;
    if (strcmp(s, "")==0)
    {
        dong++;
        continue;
    }
    if (strcmp(s, "Tao")==0)
    {
        char ten[25];
        input.getline(ten, sizeof(ten));
        if (strcmp(ten, ""))
        {
            int gt;
            input >> gt;
            cout << "Tao nguoi ten " << ten << endl;
            if (Nguoi::TimNguoi(ten))
                cout << "Da co nguoi ten la " << ten << endl;
```

```
                else
                    Nguoi::TaoNguoi(ten, gt);
            dong += 2;
            continue;
        }
    }
    if (strcmp(s, "Cuoi")==0)
    {
        char ten1[25];
        input.getline(ten1, sizeof(ten1));
        char ten2[25];
        input.getline(ten2, sizeof(ten2));
        Nguoi* A = Nguoi::TimNguoi(ten1);
        Nguoi* B = Nguoi::TimNguoi(ten2);
        cout << "Cuoi " << ten1 << " va "<< ten2 << endl;
        if (A==0) cout << "Khong co nguoi ten " << ten1 << endl;
        if (B==0) cout << "Khong co nguoi ten " << ten2 << endl;
        if (A&&B&&A->Cuoi(B)==0)
            cout << "Khong cuoi duoc\n";
        dong += 2;
        continue;
    }
    if (strcmp(s, "Sinh")==0)
    {
        char ten1[25];
        input.getline(ten1, sizeof(ten1));
        char ten2[25];
        input.getline(ten2, sizeof(ten2));
        if (strcmp(ten2, ""))
        {
            cout << ten1 << " sinh con "<< ten2 << endl;
            Nguoi* A = Nguoi::TimNguoi(ten1);
```

```
            if (A==0) cout << "Khong co nguoi ten " << ten1 << endl;
            int gt;
            input >> gt;
            if (Nguoi::TimNguoi(ten2))
                cout << "Da co nguoi ten la " << ten2 << endl;
            else
            {
                if ( A )
                    if ( A->GioiTinh() )
                        cout << ten1 << " la nam khong sinh con duoc\n";
                    else
                        ((Nu*)A)->SinhCon(ten2, gt);
            }
            dong += 3;
            continue;
        }
    }
    cout << "Loi o dong thu " << dong << endl;
    break;
    }
    cout << "Ket thuc nhap.\n";
    getch();
}

void TimQuanHe()
{
    clrscr();
    char ten1[25];
    cout << "Ten nguoi thu nhat: ";
    gets(ten1);
    Nguoi *A = Nguoi::TimNguoi(ten1);
    if (A==0)
```

```
    {
        cout << "Khong co nguoi ten " << ten1 << endl;
        getch();
        return;
    }
    char ten2[25];
    cout << "Ten nguoi thu hai: ";
    gets(ten2);
    Nguoi *B = Nguoi::TimNguoi(ten2);
    if (B==0)
    {
        cout << "Khong co nguoi ten " << ten2 << endl;
        getch();
        return;
    }
    cout << QuanHe(A, B) << endl;
    getch();
}

void Menu()
{
    clrscr();
    cout << "\n\n    Lua chon cong viec theo so\n\n";
    cout << "    1. Nhap du lieu\n";
    cout << "    2. Tim quan he\n";
    cout << "    3. Ket thuc\n";
}

void main()
{
    int i;
    Menu();
```

```
    do
    {
        i = getch();
        switch (i)
        {
            case '1':
                Nguoi::XoaDuLieu();
                NhapDuLieu();
                Menu();
                break;
            case '2':
                TimQuanHe();
                Menu();
        }
    }while (i!='3');
    Nguoi::XoaDuLieu();
}
```