

# GUI

```
#ifndef TREE_H
#define TREE_H
#include "dialog.h"
#include "ui_dialog.h"

class Tree{
private:
    TreeNode *root;

public:
    void printt(Ui::Dialog ui);

    //void tt(Dialog);
    Tree();
    ~Tree();
    bool isEmpty();

    TreeNode *SearchTree(int Key);
    TreeNode *SearchNode(TreeNode *Node,int Key);

    void left_to_right(TreeNode *&p);
    void right_to_left(TreeNode *&p);
    int Insert(TreeNode *&temp,TreeNode *newNode);
    int Insert_with_ivalue(int Key, float f, int i, char *cA);
    int Insert_without_ivalue(int Key, float f, char *cA);

    void del(TreeNode *&p, int x);
    void del(TreeNode *&p);
    void Delete(int x);
```

```

void PrintOne(TreeNode *T,Ui::Dialog ui);

void PrintTree(Ui::Dialog ui);

int Treehight(TreeNode *T);

void TreeHight();

int max(int a,int b);

void drawEllipse(QGraphicsScene *ui,TreeNode *T,double old_center,double x,double y);

void DrawEllipse(QGraphicsScene *scene);

void draw(QGraphicsScene *scene,TreeNode *T,double old_center,double x,double y);

void drawEllipse1(QGraphicsScene *ui,TreeNode *T,double old_center,double x,double y);

void DrawEllipse1(QGraphicsScene *scene);

void draw1(QGraphicsScene *scene,TreeNode *T,double old_center,double x,double y);


void drawEllipse2(QGraphicsScene *ui,TreeNode *T,double old_center,double x,double y,int k);

void DrawEllipse2(QGraphicsScene *scene,int k);

void draw2(QGraphicsScene *scene,TreeNode *T,double old_center,double x,double y,int k);

void drawEllipse3(QGraphicsScene *ui,TreeNode *T,double old_center,double x,double y,int k);

void DrawEllipse3(QGraphicsScene *scene,int k);

void draw3(QGraphicsScene *scene,TreeNode *T,double old_center,double x,double y,int k);


void splite(TreeNode *, TreeNode *&,TreeNode *&,int);

void Split(Tree *,Tree *,int);


void Go_To_View_1(Ui::Dialog ui,QGraphicsScene *scene);

void Go_To_View_2(Ui::Dialog ui,QGraphicsScene *scene);

void Go_To_View_3(Ui::Dialog ui,QGraphicsScene *scene,int k);

void Go_To_View_4(Ui::Dialog ui,QGraphicsScene *scene,int k);


void join(TreeNode *&main,TreeNode *a,TreeNode *b);

void join(TreeNode *&a,TreeNode *b);

void Join(Tree *a,Tree *b);

```

private:

```
void ClearTree(TreeNode *T);

TreeNode *clone(TreeNode * T);

void PrintAll(TreeNode *T,Ui::Dialog ui);

};

#endif // TREE_H

////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

#include "dialog.h"

#include "ui_dialog.h"

#include <QMessageBox>

#include "tree.h"

TreeNode *newNode;

Tree  *theTree = new Tree();

Tree  *theTree1 = new Tree();

Tree  *theTree2 = new Tree();

Dialog::Dialog(QWidget *parent) :

    QDialog(parent),

    ui(new Ui::Dialog)

{

    ui->setupUi(this);

    scene = new QGraphicsScene(this);

    ui->graphicsView->setScene(scene);

    QPen line(Qt::blue);

    line.setWidth(3);

    QBrush brush(Qt::red);

    scene->addEllipse(10,10,150,150,line,brush);
```

```

QGraphicsTextItem *txt1 = new QGraphicsTextItem("cArray");
QGraphicsTextItem *txt2 = new QGraphicsTextItem("Key");
QGraphicsTextItem *txt3 = new QGraphicsTextItem("ivalue");

txt1->setDefaultTextColor(Qt::green);
txt2->setDefaultTextColor(Qt::green);
txt3->setDefaultTextColor(Qt::green);
txt1->setPos(60,30);
txt2->setPos(65,70);
txt3->setPos(60,110);
scene->addItem(txt1);
scene->addItem(txt2);
scene->addItem(txt3);

    ui->page->show();
    ui->page_2->hide();
    ui->page_3->hide();
    ui->page_4->hide();
    ui->page_5->hide();
    ui->page_6->hide();
    ui->page_7->hide();
}
Dialog::~Dialog()
{
    delete ui;
}

////-----

void Dialog::on_pushButton_4_clicked()    //// Delete
{
    //// -----
    ui->page->hide();
    ui->page_2->show();

```

```

ui->page_3->hide();
ui->page_4->hide();
ui->page_5->hide();
ui->page_6->hide();
ui->page_7->hide();
//// -----
}

void Dialog::on_pushButton_14_clicked()  //// Delete
{
    if(ui->radioButton_12->isChecked()){
        theTree->Delete(ui->lineEdit_5->text().toInt());
    }
    if(ui->radioButton_13->isChecked()){
        theTree1->Delete(ui->lineEdit_5->text().toInt());
    }
    if(ui->radioButton_14->isChecked()){
        theTree2->Delete(ui->lineEdit_5->text().toInt());
    }
    ui->lineEdit_5->clear();
}

void Dialog::on_pushButton_15_clicked()  //// Go To View 1
{
    if(ui->radioButton_9->isChecked()){
        theTree->Go_To_View_1(*ui,scene);
    }
    if(ui->radioButton_10->isChecked()){
        theTree1->Go_To_View_1(*ui,scene);
    }
    if(ui->radioButton_11->isChecked()){
        theTree2->Go_To_View_1(*ui,scene);
    }
}

```

```

void Dialog::on_pushButton_16_clicked()    /// Go To View 2
{
    if(ui->radioButton_9->isChecked()){
        theTree->Go_To_View_2(*ui,scene);
    }
    if(ui->radioButton_10->isChecked()){
        theTree1->Go_To_View_2(*ui,scene);
    }
    if(ui->radioButton_11->isChecked()){
        theTree2->Go_To_View_2(*ui,scene);
    }
}

///-----

void Dialog::on_pushButton_5_clicked()    /// Splite
{
    /// -----
    ui->page->hide();
    ui->page_2->hide();
    ui->page_3->show();
    ui->page_4->hide();
    ui->page_5->hide();
    ui->page_6->hide();
    ui->page_7->hide();
    /// -----
}

void Dialog::on_pushButton_7_clicked()
{
    theTree->Split(theTree1,theTree2,ui->lineEdit_6->text().toInt());
    ui->lineEdit_6->clear();
}

void Dialog::on_pushButton_11_clicked()    /// view 1
{

```

```

if(ui->radioButton_15->isChecked()){
    theTree->Go_To_View_1(*ui,scene);
}
if(ui->radioButton_16->isChecked()){
    theTree1->Go_To_View_1(*ui,scene);
}
if(ui->radioButton_17->isChecked()){
    theTree2->Go_To_View_1(*ui,scene);
}
}

void Dialog::on_pushButton_9_clicked()    //// view 2
{
    if(ui->radioButton_15->isChecked()){
        theTree->Go_To_View_2(*ui,scene);
    }
    if(ui->radioButton_16->isChecked()){
        theTree1->Go_To_View_2(*ui,scene);
    }
    if(ui->radioButton_17->isChecked()){
        theTree2->Go_To_View_2(*ui,scene);
    }
}

////-----

void Dialog::on_pushButton_3_clicked()    //// Insert
{
    //// -----
    ui->page->hide();
    ui->page_2->hide();
    ui->page_3->hide();
    ui->page_4->show();
    ui->page_5->hide();
    ui->page_6->hide();
}

```

```

ui->page_7->hide();

//// -----
}

void Dialog::on_pushButton_12_clicked()    /// Push
{
    //ui->label_8->setText(ui->lineEdit->text());/// cArray
    //ui->label_9->setText(ui->lineEdit_2->text());
    //ui->label_10->setText((ui->lineEdit_3->text()));
    //ui->label_11->setText((ui->lineEdit_4->text()));

    int n1 = ui->lineEdit_3->text().toInt();
    int n2 = ui->lineEdit_4->text().toInt();
    int n3 = ui->lineEdit_2->text().toInt();

    char n4[7];

    QString a = ui->lineEdit->text();
    QByteArray ba = a.toLatin1();
    strcpy(n4,ba.data());/////////////////

    if (ui->radioButton_3->isChecked()){
        if (ui->radioButton->isChecked()){
            theTree->Insert_without_ivalue(n1,n2,n4);
        }else{
            theTree->Insert_with_ivalue(n1,n2,n3,n4);
        }
    }

    if (ui->radioButton_4->isChecked()){
        if (ui->radioButton->isChecked()){
            theTree1->Insert_without_ivalue(n1,n2,n4);
        }else{
            theTree1->Insert_with_ivalue(n1,n2,n3,n4);
        }
    }

    if (ui->radioButton_5->isChecked()){

```



```

        if (ui->radioButton->isChecked()){
            theTree2->Insert_without_ivalue(n1,n2,n4);
        }else{
            theTree2->Insert_with_ivalue(n1,n2,n3,n4);
        }
    }
    ui->lineEdit->clear();
    ui->lineEdit_2->clear();
    ui->lineEdit_3->clear();
    ui->lineEdit_4->clear();
}

void Dialog::on_pushButton_13_clicked()    //// Go To View 1
{
    if(ui->radioButton_6->isChecked()){
        theTree->Go_To_View_1(*ui,scene);
    }
    if(ui->radioButton_7->isChecked()){
        theTree1->Go_To_View_1(*ui,scene);
    }
    if(ui->radioButton_8->isChecked()){
        theTree2->Go_To_View_1(*ui,scene);
    }
}

void Dialog::on_pushButton_17_clicked()    //// Go To View 2
{
    if(ui->radioButton_6->isChecked()){
        theTree->Go_To_View_2(*ui,scene);
    }
    if(ui->radioButton_7->isChecked()){
        theTree1->Go_To_View_2(*ui,scene);
    }
    if(ui->radioButton_8->isChecked()){

```

```

    theTree2->Go_To_View_2(*ui,scene);
}
}
////-----
void Dialog::on_pushButton_2_clicked()    /// Credit
{
    //scene->clear();

    ui->page->show();
    ui->page_2->hide();
    ui->page_3->hide();
    ui->page_4->hide();
    ui->page_5->hide();
    ui->page_6->hide();
    ui->page_7->hide();

    scene->clear();

    QPen line(Qt::red);
    line.setWidth(3);
    scene->addEllipse(0,0,200,200,line);

    QGraphicsTextItem *txt1 = new QGraphicsTextItem("عبد الرحمن الحوراني");
    QGraphicsTextItem *txt2 = new QGraphicsTextItem("محمد عيد التل");
    QGraphicsTextItem *txt3 = new QGraphicsTextItem("محمد الخياط");
    QGraphicsTextItem *txt4 = new QGraphicsTextItem("وائل حموش");

    txt1->setDefaultTextColor(Qt::green);
    txt2->setDefaultTextColor(Qt::green);
    txt3->setDefaultTextColor(Qt::green);
    txt4->setDefaultTextColor(Qt::green);

```

```

txt1->setPos(35,30);

txt2->setPos(50,70);

txt3->setPos(55,100);

txt4->setPos(55,120);

scene->addItem(txt1);

scene->addItem(txt2);

scene->addItem(txt3);

scene->addItem(txt4);

}

////-----

void Dialog::on_pushButton_clicked()    //// Join
{
    //// -----
    ui->page->hide();
    ui->page_2->hide();
    ui->page_3->hide();
    ui->page_4->hide();
    ui->page_5->hide();
    ui->page_6->show();
    ui->page_7->hide();
    //// -----
}

void Dialog::on_pushButton_20_clicked()    //// Join
{
    theTree->Join(theTree1,theTree2);
}

void Dialog::on_pushButton_18_clicked()    //// Go To View 1
{
    theTree->Go_To_View_1(*ui,scene);
}

void Dialog::on_pushButton_19_clicked()    //// Go To View 2

```

```

{
    theTree->Go_To_View_2(*ui,scene);
}

////-----

void Dialog::on_pushButton_6_clicked()    /// Search
{
    /// -----
    ui->page->hide();
    ui->page_2->hide();
    ui->page_3->hide();
    ui->page_4->hide();
    ui->page_5->show();
    ui->page_6->hide();
    ui->page_7->hide();
    /// -----
}

void Dialog::on_pushButton_8_clicked()
{
    if(ui->radioButton_21->isChecked()){
        theTree->SearchTree(ui->lineEdit_7->text().toInt());
        if(ui->radioButton_18->isChecked()){
            theTree->Go_To_View_3(*ui,scene,ui->lineEdit_7->text().toInt());
        }
        if(ui->radioButton_19->isChecked()){
            theTree->Go_To_View_4(*ui,scene,ui->lineEdit_7->text().toInt());
        }
    }

    if(ui->radioButton_22->isChecked()){
        theTree1->SearchTree(ui->lineEdit_7->text().toInt());
        if(ui->radioButton_18->isChecked()){
            theTree1->Go_To_View_3(*ui,scene,ui->lineEdit_7->text().toInt());
        }
    }
}

```

```
    if(ui->radioButton_19->isChecked()){
        theTree1->Go_To_View_4(*ui,scene,ui->lineEdit_7->text().toInt());
    }
}

if(ui->radioButton_23->isChecked()){
    theTree2->SearchTree(ui->lineEdit_7->text().toInt());
    if(ui->radioButton_18->isChecked()){
        theTree2->Go_To_View_3(*ui,scene,ui->lineEdit_7->text().toInt());
    }
    if(ui->radioButton_19->isChecked()){
        theTree2->Go_To_View_4(*ui,scene,ui->lineEdit_7->text().toInt());
    }
}

ui->lineEdit_5->clear();
}

void Dialog::on_radioButton_clicked()
{
    ui->lineEdit_2->setEnabled(false);
}

void Dialog::on_radioButton_2_clicked()
{
    ui->lineEdit_2->setEnabled(true);
}
```

```
void Tree::drawEllipse(QGraphicsScene *scene,TreeNode *T,double old_center,double center,double y){
```

```
    QPen line(Qt::blue);
```

```
    line.setWidth(3);
```

```
    QBrush brush(Qt::red);
```

```
    scene->addEllipse(center*12,y,10,10,line,brush);
```

```
    QPen linepen(Qt::black);
```

```
    linepen.setWidth(1);
```

```
    if (T != root){
```

```
        if (((center*12)+7)<((old_center*12)+42)&&(y+16)>(y-18)){
```

```
            scene->addLine((old_center*12)+5,y-10,(center*12)+8,y,linepen);
```

```
        }else{
```

```
            scene->addLine((old_center*12)+8,y-10,(center*12),y+4,linepen);
```

```
        }
```

```
    }
```

```
}
```

```
void Tree::draw(QGraphicsScene *scene,TreeNode *T,double old_center,double center,double y){
```

```
    if(T != NULL)
```

```
    {
```

```
        drawEllipse(scene,T,old_center,center,y);
```

```
        old_center = center;
```

```
        if (T == root){center = -1;old_center = 0;}
```

```
        draw(scene,T->left,old_center,center - T->balance,y+18);
```

```
        if (T == root){center = 1;old_center = 0;}
```

```
        draw(scene,T->right,old_center,center + T->balance,y+18);
```

```
    }
```

```
}
```

```
void Tree::DrawEllipse(QGraphicsScene *scene){
```

```
    draw(scene,root,0,0,10);
```

```
}
```

```
void Tree::drawEllipse1(QGraphicsScene *scene,TreeNode *T,double old_center,double center,double y){
```

```
    QPen line(Qt::blue);
```

```

line.setWidth(3);

QBrush brush(Qt::red);

QGraphicsTextItem *txt = new QGraphicsTextItem(T->cArray);
QGraphicsTextItem *txt1 = new QGraphicsTextItem(QString::number(T->Key));
QGraphicsTextItem *txt2 = new QGraphicsTextItem(QString::number(T->balance+1));

txt->setY(y+10);

txt->setX(center*120+25);

txt1->setY(y+30);

txt1->setX(center*120+38);

txt2->setY(y+50);

txt2->setX(center*120+38);

txt->setDefaultTextColor(Qt::green);
txt1->setDefaultTextColor(Qt::green);
txt2->setDefaultTextColor(Qt::green);

scene->addEllipse(center*120,y,100,100,line,brush);

scene->addItem(txt);
scene->addItem(txt1);
scene->addItem(txt2);

QPen linepen(Qt::yellow);

linepen.setWidth(4);

if (T != root){
    if (((center*120)+7)<((old_center*120)+42)&&(y+16)>(y-18)){
        scene->addLine((old_center*120)+48,y-18,(center*120)+93,y+16,linepen);
    }else{
        scene->addLine((old_center*120)+48,y-18,(center*120)+7,y+16,linepen);
    }
}

}

void Tree::draw1(QGraphicsScene *scene,TreeNode *T,double old_center,double center,double y){
    if(T != NULL)
    {

```

```

    drawEllipse1(scene,T,old_center,center,y);

    old_center = center;

    if (T == root){center = -1;old_center = 0;}

    draw1(scene,T->left,old_center,center - T->balance,y+120);

    if (T == root){center = 1;old_center = 0;}

    draw1(scene,T->right,old_center,center + T->balance,y+120);

}

}

void Tree::DrawEllipse1(QGraphicsScene *scene){

    draw1(scene,root,0,0,10);

}

void Tree::drawEllipse2(QGraphicsScene *scene,TreeNode *T,double old_center,double center,double y,int k){

    QPen line(Qt::blue);

    line.setWidth(3);

    QBrush brush(Qt::red);

    if (T->Key == k){

        brush.setColor(Qt::yellow);

    }

    QGraphicsTextItem *txt = new QGraphicsTextItem(T->cArray);

    QGraphicsTextItem *txt1 = new QGraphicsTextItem(QString::number(T->Key));

    QGraphicsTextItem *txt2 = new QGraphicsTextItem(QString::number(T->balance+1));

    txt->setY(y+10);

    txt->setX(center*120+25);

    txt1->setY(y+30);

    txt1->setX(center*120+38);

    txt2->setY(y+50);

    txt2->setX(center*120+38);

    txt->setDefaultTextColor(Qt::green);

    txt1->setDefaultTextColor(Qt::green);

    txt2->setDefaultTextColor(Qt::green);

    scene->addEllipse(center*120,y,100,100,line,brush);

```



```

scene->addItem(txt);
scene->addItem(txt1);
scene->addItem(txt2);
QPen linepen(Qt::yellow);
linepen.setWidth(4);

if (T != root){
    if (((center*120)+7)<((old_center*120)+42)&&(y+16)>(y-18)){
        scene->addLine((old_center*120)+48,y-18,(center*120)+93,y+16,linepen);
    }else{
        scene->addLine((old_center*120)+48,y-18,(center*120)+7,y+16,linepen);
    }
}

}

void Tree::draw2(QGraphicsScene *scene,TreeNode *T,double old_center,double center,double y,int k){
    if(T != NULL)
    {
        drawEllipse2(scene,T,old_center,center,y, k);
        old_center = center;
        if (T == root){center = -1;old_center = 0;}
        draw2(scene,T->left,old_center,center - T->balance,y+120,k);
        if (T == root){center = 1;old_center = 0;}
        draw2(scene,T->right,old_center,center + T->balance,y+120,k);
    }
}

void Tree::DrawEllipse2(QGraphicsScene *scene,int k){
    draw2(scene,root,0,0,10,k);
}

void Tree::drawEllipse3(QGraphicsScene *scene,TreeNode *T,double old_center,double center,double y,int k){

```

```

QPen line(Qt::blue);

line.setWidth(2);

QBrush brush(Qt::red);

if (T->Key == k){
    brush.setColor(Qt::yellow);
}

scene->addEllipse(center*12,y,10,10,line,brush);

QPen linepen(Qt::black);

linepen.setWidth(1);


if (T != root){
    if (((center*12)+7)<((old_center*12)+42)&&(y+16)>(y-18)){
        scene->addLine((old_center*12)+5,y-10,(center*12)+8,y,linepen);
    }else{
        scene->addLine((old_center*12)+8,y-10,(center*12),y+4,linepen);
    }
}

}

void Tree::draw3(QGraphicsScene *scene,TreeNode *T,double old_center,double center,double y,int k){
    if(T != NULL)
    {
        drawEllipse3(scene,T,old_center,center,y, k);

        old_center = center;

        if (T == root){center = -1;old_center = 0;}

        draw3(scene,T->left,old_center,center - T->balance,y+18, k);

        if (T == root){center = 1;old_center = 0;}

        draw3(scene,T->right,old_center,center + T->balance,y+18, k);
    }
}

void Tree::DrawEllipse3(QGraphicsScene *scene,int k){
    draw3(scene,root,0,0,10,k);
}

```

```
}

void Tree::Go_To_View_1(Ui::Dialog ui,QGraphicsScene *scene){

    ui.page->show();
    ui.page_2->hide();
    ui.page_3->hide();
    ui.page_4->hide();
    ui.page_5->hide();
    ui.page_6->hide();
    ui.page_7->hide();


    scene->clear();
    TreeHight();
    DrawEllipse(scene);
}

void Tree::Go_To_View_2(Ui::Dialog ui,QGraphicsScene *scene){

    ui.page->show();
    ui.page_2->hide();
    ui.page_3->hide();
    ui.page_4->hide();
    ui.page_5->hide();
    ui.page_6->hide();
    ui.page_7->hide();


    scene->clear();
    TreeHight();
    DrawEllipse1(scene);
}

void Tree::Go_To_View_3(Ui::Dialog ui,QGraphicsScene *scene,int k){

    ui.page->show();
    ui.page_2->hide();
    ui.page_3->hide();
    ui.page_4->hide();
```

```
    ui.page_5->hide();  
    ui.page_6->hide();  
    ui.page_7->hide();  
  
    scene->clear();  
    TreeHight();  
    DrawEllipse2(scene,k);  
}  
void Tree::Go_To_View_4(Ui::Dialog ui,QGraphicsScene *scene,int k){  
    ui.page->show();  
    ui.page_2->hide();  
    ui.page_3->hide();  
    ui.page_4->hide();  
    ui.page_5->hide();  
    ui.page_6->hide();  
    ui.page_7->hide();  
  
    scene->clear();  
    TreeHight();  
    DrawEllipse3(scene,k);  
}
```