import java.awt.BorderLayout;

import java.awt.Container;

import java.awt.FlowLayout;

import java.awt.GridLayout;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;

import java.util.Random;

import javax.swing.BoxLayout;

import javax.swing.ButtonGroup;

import javax.swing.JButton;

import javax.swing.JFrame;

import javax.swing.JLabel;

import javax.swing.JOptionPane;

import javax.swing.JPanel;

import javax.swing.JRadioButton;

import javax.swing.JTextField;

import javax.swing.Timer;

import javax.swing.border.CompoundBorder;

import javax.swing.border.EmptyBorder;

import javax.swing.border.TitledBorder;

public class MathQuiz extends JFrame implements ActionListener{

static final int MAX\_QUESTIONS = 10;

// Start and Stop button

private JButton btStart, btStop;

// radio buttons for question type

JRadioButton rdBtAdd, rdBtSubtract, rdBtMultiply, rdBtDivide;

// radio buttons for selecting a level

JRadioButton rdBtLevel0To5, rdBtLevel3To9, rdBtLevel0To20, rdBtLevelAnyTwoDigits;

// button for the quetion type and level

ButtonGroup grType, grLevel;

// text box for answer

JTextField txAnswer;

// random number generator

Random rand = new Random();

// the timer

Timer timer = new Timer(1000, this);

// count of correct answers

int correctCount = 0;

// number of seconds elapased

int secsElapsed = 0;

// numbers of the current question

int number1, number2;

// range of numbers as per level

int numberMax=0, numberMin=5;

// answer of current question

int answer;

// count of questions being asked

int countQuestions = 0;

// text for question, correct count and time spent

JLabel lblQuestion, lblCorrectCount, lblTimeSpent;

public MathQuiz(){

super("MathQuiz");

Container cont = this.getContentPane();

cont.setLayout(new BorderLayout());

// create the top panel to show question type and level

JPanel p1 = new JPanel();

p1.setLayout(new GridLayout(1, 2, 5, 0));

JPanel p1Child1 = new JPanel();

p1Child1.setBorder(new CompoundBorder(new TitledBorder("Choose a type"), new EmptyBorder(5, 5, 5, 5)));

p1Child1.setLayout(new BoxLayout(p1Child1, BoxLayout.Y\_AXIS));

grType = new ButtonGroup();

rdBtAdd = new JRadioButton("Add", true);

grType.add(rdBtAdd);

rdBtSubtract = new JRadioButton("Subtract");

grType.add(rdBtSubtract);

rdBtMultiply = new JRadioButton("Multiply");

grType.add(rdBtMultiply);

rdBtDivide = new JRadioButton("Divide");

grType.add(rdBtDivide);

p1Child1.add(rdBtAdd);

p1Child1.add(rdBtSubtract);

p1Child1.add(rdBtMultiply);

p1Child1.add(rdBtDivide);

p1.add(p1Child1);

JPanel p1Child2 = new JPanel();

p1Child2.setBorder(new CompoundBorder(new TitledBorder("Choose a level"), new EmptyBorder(5, 5, 5, 5)));

p1Child2.setLayout(new BoxLayout(p1Child2, BoxLayout.Y\_AXIS));

grLevel = new ButtonGroup();

rdBtLevel0To5 = new JRadioButton("Numbers from 0 to 5", true);

rdBtLevel0To5.addActionListener(this);

grLevel.add(rdBtLevel0To5);

rdBtLevel3To9 = new JRadioButton("Numbers from 3 to 9", true);

rdBtLevel3To9.addActionListener(this);

grLevel.add(rdBtLevel3To9);

rdBtLevel0To20 = new JRadioButton("Numbers from 0 to 20", true);

rdBtLevel0To20.addActionListener(this);

grLevel.add(rdBtLevel0To20);

rdBtLevelAnyTwoDigits= new JRadioButton("Any two digits", true);

rdBtLevelAnyTwoDigits.addActionListener(this);

grLevel.add(rdBtLevelAnyTwoDigits);

p1Child2.add(rdBtLevel0To5);

p1Child2.add(rdBtLevel3To9);

p1Child2.add(rdBtLevel0To20);

p1Child2.add(rdBtLevelAnyTwoDigits);

p1.add(p1Child2);

// create the middle panel to question and answer input text box

JPanel p2 = new JPanel(new GridLayout(1, 2));

JPanel p2Child1 = new JPanel(new BorderLayout());

//p2Child1.setBorder(new CompoundBorder(new TitledBorder("Correct Count"), new EmptyBorder(5, 5, 5, 5)));

JLabel l1 = new JLabel("Question:");

l1.setAlignmentX(0.0f);

p2Child1.add(l1, BorderLayout.NORTH);

lblQuestion = new JLabel("Question will be shown");

lblQuestion.setHorizontalAlignment(JLabel.RIGHT);

p2Child1.add(lblQuestion, BorderLayout.CENTER);

p2.add(p2Child1);

JPanel p = new JPanel();

p.setBorder(new EmptyBorder(17, 5, 5, 10));

p2Child1.add(p, BorderLayout.SOUTH);

JPanel p2Child2 = new JPanel(new BorderLayout());

//p2Child2.setBorder(new CompoundBorder(new TitledBorder("Time Spent"), new EmptyBorder(5, 5, 5, 5)));

l1 = new JLabel("Answer:");

l1.setAlignmentX(0.0f);

p2Child2.add(l1, BorderLayout.NORTH);

txAnswer = new JTextField(15);

txAnswer.addActionListener(this);

p2Child2.add(txAnswer, BorderLayout.CENTER);

p2.add(p2Child2);

JPanel p2Child3 = new JPanel(new FlowLayout(FlowLayout.TRAILING));

// create the Start button

btStart = new JButton("Start");

btStart.addActionListener(this);

p2Child3.add(btStart);

// create the Stop button

btStop = new JButton("Stop");

btStop.addActionListener(this);

p2Child3.add(btStop);

p2Child2.add(p2Child3, BorderLayout.SOUTH);

// create the bottom panel to show correct count and time spent

JPanel p3 = new JPanel(new GridLayout(1, 2));

JPanel p3Child1 = new JPanel(new BorderLayout());

p3Child1.setBorder(new CompoundBorder(new TitledBorder("Correct Count"), new EmptyBorder(5, 5, 5, 5)));

// create the lable for correct count

lblCorrectCount = new JLabel("Correct count will be shown");

p3Child1.add(lblCorrectCount, BorderLayout.CENTER);

p3.add(p3Child1);

// create the lable for time spent

JPanel p3Child2 = new JPanel(new BorderLayout());

p3Child2.setBorder(new CompoundBorder(new TitledBorder("Time Spent"), new EmptyBorder(5, 5, 5, 5)));

lblTimeSpent = new JLabel("Time spent will be shown");

p3Child2.add(lblTimeSpent, BorderLayout.CENTER);

p3.add(p3Child2);

// add all the panels to the frame

cont.add(p1, BorderLayout.NORTH);

cont.add(p2, BorderLayout.CENTER);

cont.add(p3, BorderLayout.SOUTH);

}

@Override

public void actionPerformed(ActionEvent e) {

// handle all the change in radio buttons, button click events and

// answer text box ENTER event

// get the UI control that caused the event

Object src = e.getSource();

if(src == timer){

// timer fired after 1 sec

secsElapsed++;

lblTimeSpent.setText(secsElapsed + " seconds");

}

else if(src == btStart){

// Start

start();

}else if(src == btStop){

// Stop

stop();

}else if(src == txAnswer){

// answer text box ENTER

if(timer.isRunning()){

String input = txAnswer.getText();

try{

int userAns = Integer.parseInt(input);

if(userAns == answer){

correctCount++;

lblCorrectCount.setText("" + correctCount);

}

}catch(NumberFormatException ex){

}

txAnswer.setText("");

generateQuestionAnswer();

countQuestions++;

if(countQuestions == MAX\_QUESTIONS){

String msg = "\*\*\*\*\* QUIZ OVER \*\*\*\*\*\*\n";

msg += "Score: "+correctCount+"/"+MAX\_QUESTIONS;

JOptionPane.showMessageDialog(this, msg, "Score", JOptionPane.INFORMATION\_MESSAGE);

stop();

}

}

}

}

// Stop the quiz and reset UI

private void stop() {

correctCount = 0;

countQuestions = 0;

secsElapsed = 0;

if(timer.isRunning())

timer.stop();

btStop.setEnabled(false);

btStart.setEnabled(true);

lblQuestion.setText("Question will be shown");

}

// Start the quiz again

private void start() {

correctCount = 0;

lblCorrectCount.setText("0");

lblTimeSpent.setText("0 secs");

generateQuestionAnswer();

timer.start();

btStart.setEnabled(false);

btStop.setEnabled(true);

}

// generate two numbers and the answer as per question type

// and level

private void generateQuestionAnswer() {

String question = "";

if (rdBtLevel0To5.isSelected()) {

// generate two numbers between 0 to 5

number1 = rand.nextInt(6);

number2 = rand.nextInt(6);

if(rdBtDivide.isSelected() && number2 == 0){

while(number2 == 0){

number2 = rand.nextInt(6);

}

}

} else if (rdBtLevel3To9.isSelected()) {

// generate two numbers between 3 to 9

number1 = 3 + rand.nextInt(4);

number2 = 3 + rand.nextInt(4);

if(rdBtDivide.isSelected() && number2 == 0){

while(number2 == 0){

number2 = 3 + rand.nextInt(4);

}

}

} else if (rdBtLevel0To20.isSelected()) {

// generate two numbers between 0 to 20

number1 = rand.nextInt(21);

number2 = rand.nextInt(21);

if(rdBtDivide.isSelected() && number2 == 0){

while(number2 == 0){

number2 = rand.nextInt(21);

}

}

}else{

// generate two numbers with any two digits

number1 = 10 + rand.nextInt(91);

number2 = 10 + rand.nextInt(91);

if(rdBtDivide.isSelected() && number2 == 0){

while(number2 == 0){

number2 = 10 + rand.nextInt(91);

}

}

}

// compute the answer

if (rdBtAdd.isSelected()) {

question = String.format("%d + %d = ", number1, number2);

answer = number1 + number2;

} else if (rdBtSubtract.isSelected()) {

question = String.format("%d - %d = ", number1, number2);

answer = number1 - number2;

} else if (rdBtMultiply.isSelected()) {

question = String.format("%d \* %d = ", number1, number2);

answer = number1 \* number2;

} else {

question = String.format("%d / %d = ", number1, number2);

answer = number1 / number2;

}

// display the question

lblQuestion.setText(question);

}

public static void main(String[] args){

MathQuiz quiz = new MathQuiz();

quiz.setDefaultCloseOperation(EXIT\_ON\_CLOSE);

quiz.setSize(600, 280);

quiz.setVisible(true);

quiz.setResizable(false);

quiz.setLocationRelativeTo(null);

}

}