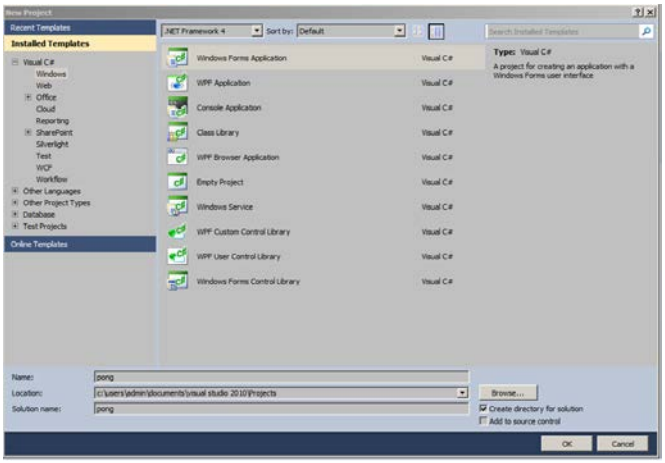
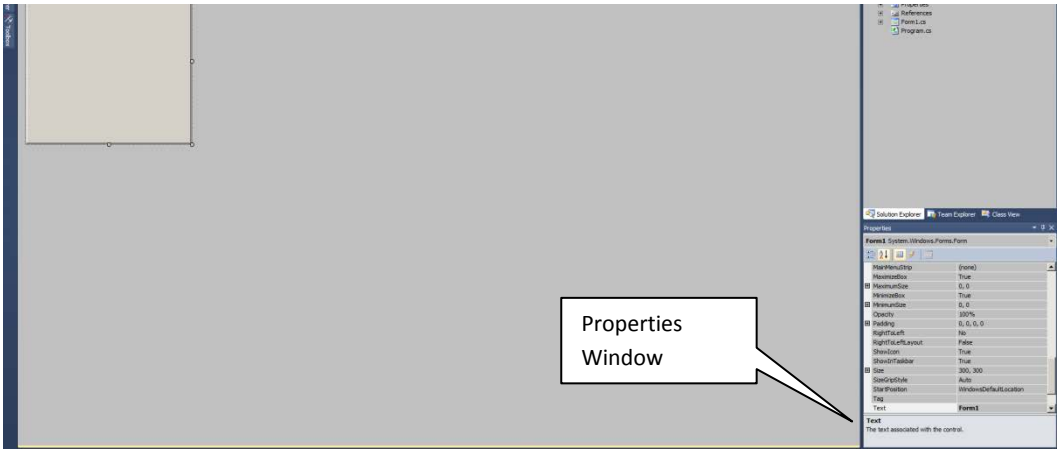
Start Visual studio, create a new project, under C# programming language choose Windows Form Application and name project pong and click OK.



Click OK

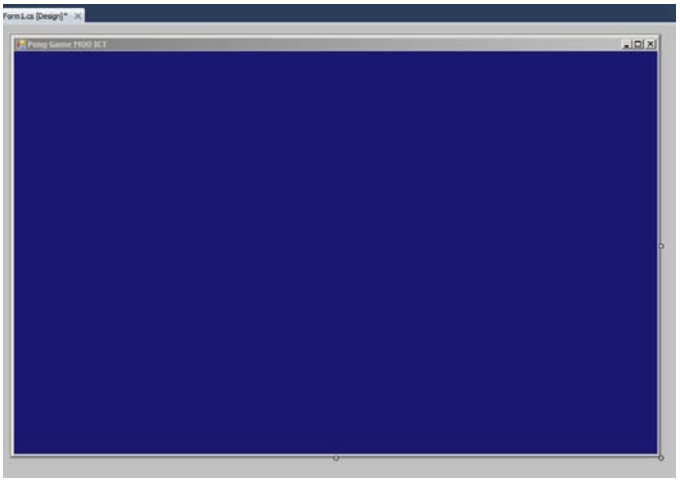


In the properties windows change the following for the form

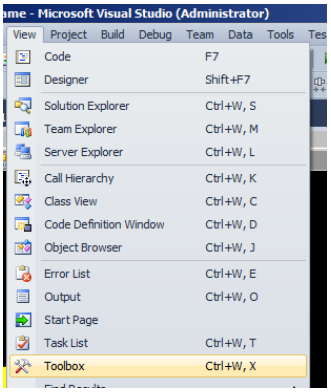
Backcolor - **MidnightBlue**

Size - **944, 613**

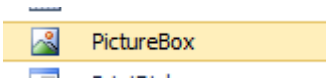
Text - **Pong Game MOO ICT**



This is what the form looks like now after we made the changes in the properties.

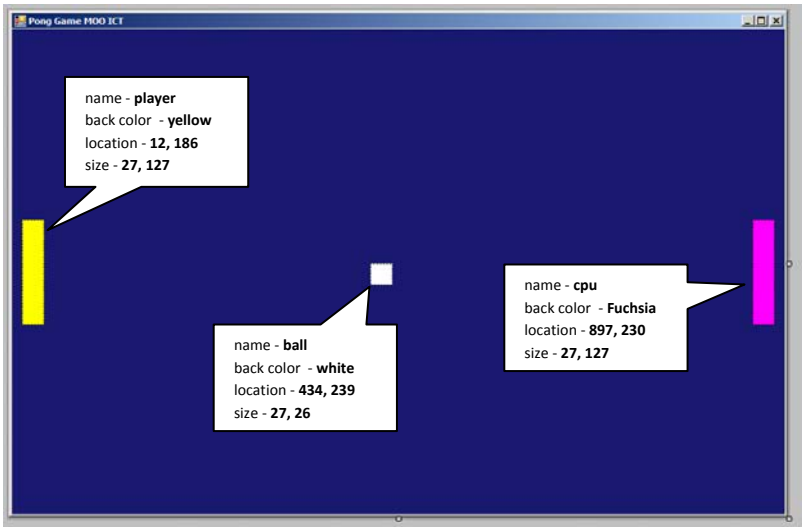


We need the tool box, if the tool box isn't present then go to View -> Click ok Toolbox

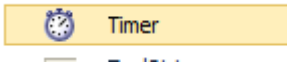


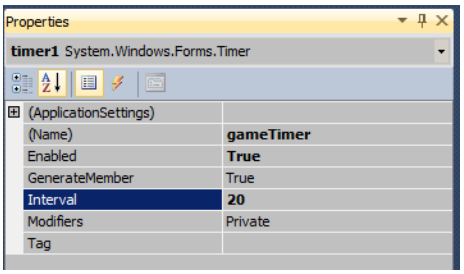
Find the picture box from the tool box and place 3 of them on the form

Set their properties to the following



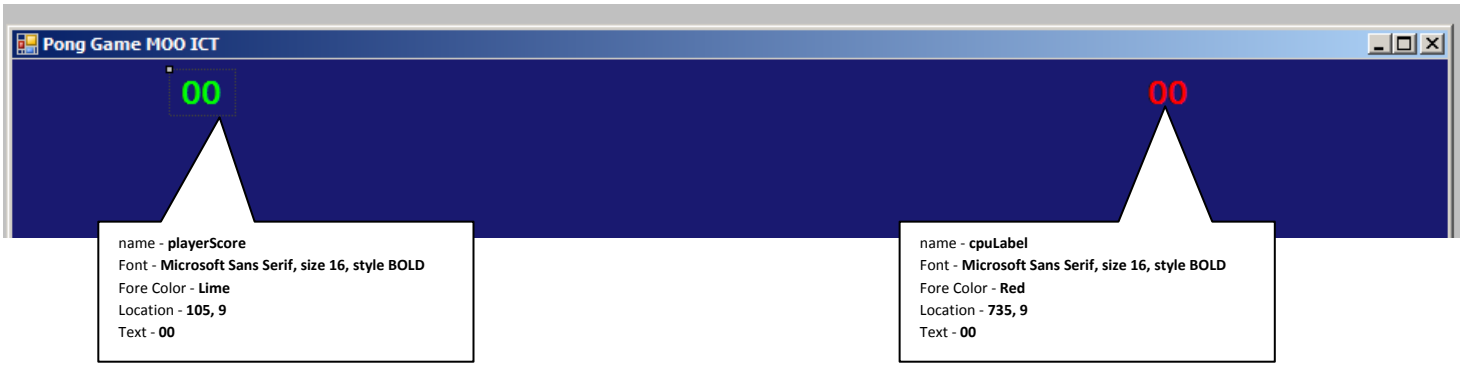
Now from the tool box drag and drop a timer object to the form



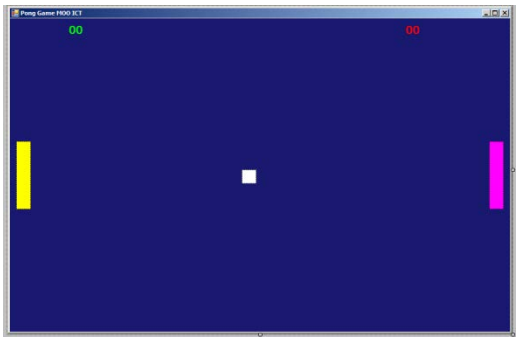


Change the following to the timer properties. Change the name to gameTimer, change enabled to True and interval to 20.

Drag and drop 2 labels to the form from the toolbox. Change the following to these labels in the properties window.



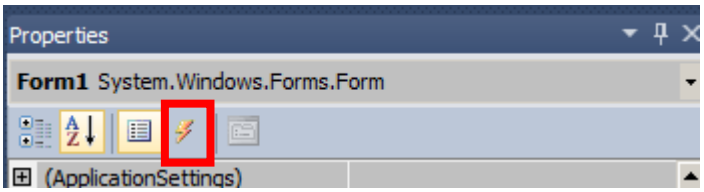
With all this done



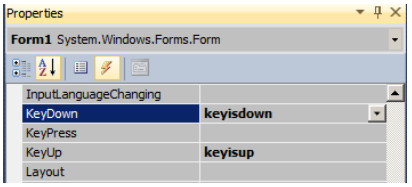
This is the final version of the form thus far.

Click on the Form and go to the events menu in the properties window.

Click on the little lightning bolt icon in the properties window to see the events menu

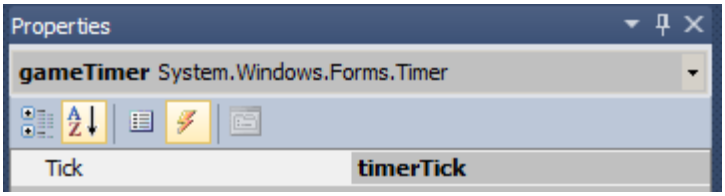


This is the events menu.



Find the key down and key up option, type **keyisdown** for key down and **keyisup** for key up event. Press enter after each, this will take you to the code view. For now come back to the design view we need add one more event for the timer.

Click on the timer object and go to the events window for the timer object



Type in **timerTick** and press enter. This will take you back to the code view. Now we can get to programming the game.

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
```

```
namespace pong
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }

        private void keyisdown(object sender, KeyEventArgs e)
        {

        }

        private void keyisup(object sender, KeyEventArgs e)
        {

        }

        private void timerTick(object sender, EventArgs e)
        {

        }
    }
}
```

These are events that we added to the game so far.

Now we will add a few variables to the game. All of these variables will be global variables so we need to declare them on top of the public Form1() line

```
        bool goup; // boolean to be used to detect player up position
        bool godown; // boolean to be used to detect player down position
        int speed = 5; // integer called speed holding value of 5
        int ballx = 5; // horizontal X speed value for the ball object
        int bally = 5; // vertical Y speed value for the ball object
        int score = 0; // score for the player
        int cpuPoint = 0; // score for the CPU
// all the green lines are comments they can be inserted into the code for easy reading and keeping
notes on the code. All of the codes will be explained in the green text.
```

We have several variables for this game.

Bool stands for Boolean we have two of them in the code above. GOUP and GODOWN both Booleans are set the false by default these will be used to check when to move the player up or down the screen.

INT stands for integer. We have SPEED, BALLX, BALLY, SCORE and CPUPOINT as integers. Each of the has their own value for example BALLX will determine the horizontal speed of the ball and BALLY will determine the vertical speed of the ball.

key down event

```
        private void keyisdown(object sender, KeyEventArgs e)
        {
            if (e.KeyCode == Keys.Up)
            {
                // if player presses the up key
                // change the go up boolean to true
                goup = true;
            }
            if (e.KeyCode == Keys.Down)
            {
                // if player presses the down key
                // change the go down boolean to true
                godown = true;
            }
        }
```

In this KEYISDOWN function we have two if statement. In each we are checking if that given key is down for example if the player presses and holds the UP key then the GOUP Boolean becomes true so does the for the down key.

Key up event

```
        private void keyisup(object sender, KeyEventArgs e)
        {
            if (e.KeyCode == Keys.Up)
            {
                // if player leaves the up key
                // change the go up boolean to false
                goup = false;
            }
            if (e.KeyCode == Keys.Down)
            {
```

```
            // if player leaves the down key
            // change the go down boolean to false
            godown = false;
        }
    }
```

In this KEYISUP function if the player leaves that key then we can change those Booleans to false. This event will only run when the key is pressed and released.

Timer Tick event function. In this function all the code will run during the timer ticks, we set the timer to run every 20 milliseconds so all of these code will be loaded during that time. This gives us a change to check for collision, move the ball, animate the player, animate the CPU and update the score or even end the game. All of the code below are commented so please read them through.

```
    private void timerTick(object sender, EventArgs e)
    {
        // this is the main timer event, this event will trigger every 20 milliseconds

        playerScore.Text = "" + score; // show player score on label 1
        cpuLabel.Text = "" + cpuPoint; // show CPU score on label 2

        ball.Top -= bally; // assign the ball TOP to ball Y integer
        ball.Left -= ballx; // assign the ball LEFT to ball X integer

        cpu.Top += speed; // assignment the CPU top speed integer

        // if the score is less than 5
        if (score < 5)
        {
            // then do the following

            // if CPU has reached the top or gone to the bottom of the screen
            if (cpu.Top < 0 || cpu.Top > 455)
            {
                //then
                //change the speed direction so it moves back up or down
                speed = -speed;
            }
        }
        else
        {
            // if the score is greater than 5
            // then make the game difficult by
            // allowing the CPU follow the ball so it doesn't miss
            cpu.Top = ball.Top + 30;
        }


        //check the score
        // if the ball has gone pass the player through the left
        if (ball.Left < 0)
        {
            //then
            ball.Left = 434; // reset the ball to the middle of the screen
            ballx = -ballx; // change the balls direction
            ballx -= 2; // increase the speed
            cpuPoint++; // add 1 to the CPU score
        }

        // if the ball has gone past the right through CPU

        if (ball.Left + ball.Width > ClientSize.Width)
        {
            // then
            ball.Left = 434;  // set the ball to centre of the screen
            ballx = -ballx; // change the direction of the ball
            ballx += 2; // increase the speed of the ball
            score++; // add one to the players score
        }

        //controlling the ball
        // if the ball either reachers the top of the screen or the bottom
        if (ball.Top < 0 || ball.Top + ball.Height > ClientSize.Height)
        {
            // then
            //reverse the speed of the ball so it stays within the screen
            bally = -bally;
        }


        // if the ball hits the player or the CPU
        if (ball.Bounds.IntersectsWith(player.Bounds) || ball.Bounds.IntersectsWith(cpu.Bounds))
```

```
            {
                // then bounce the ball in the other direction
                ballx = -ballx;
            }

            // controlling the player

            // if go up boolean is true and player is within the top boundary
            if (goup == true && player.Top > 0)
            {
                // then
                // move player towards to the top
                player.Top -= 8;
            }

            // if go down boolean is true and player is within the bottom boundary
            if (godown == true && player.Top < 455)
            {
                // then
                // move player towards the bottom of screen
                player.Top += 8;
            }

            // final score and ending the game
            // if the player score more than 10
            // then we will stop the timer and show a message box
            if(score > 10)
            {
                gameTimer.Stop();
                MessageBox.Show("You win this game");
            }
            // if the CPU scores more than 10
            // then we will stop the timer and show a message box
            if(cpuPoint > 10)
            {
                gameTimer.Stop();
                MessageBox.Show("CPU wins, you lose");
            }
        }
```

Inspecting the timer tick function.

```
            playerScore.Text = "" + score; // show player score on label 1
            cpuLabel.Text = "" + cpuPoint; // show CPU score on label 2
```

First update the two labels on the screen with the integers we created earlier.

```
            ball.Top -= bally; // assign the ball TOP to ball Y integer
            ball.Left -= ballx; // assign the ball LEFT to ball X integer
```

Move the ball Horizontally and Vertically. Each object added to C# has their own properties. For example the ball picture box we are using it has a property called TOP and LEFT. We can animate this by speed it up using -= sign and a number. This will increase the speed towards the left and top of the screen. If we used += then it would increase the speed towards the right and bottom of the screen.

```
cpu.Top += speed; // assignment the CPU top speed integer
```

In the CPU picture box we are using += with the speed variable this means the CPU will start off by moving downwards.

```
            // if the score is less than 5
            if (score < 5)
            {
                // then do the following

                // if CPU has reached the top or gone to the bottom of the screen
                if (cpu.Top < 0 || cpu.Top > 455)
                {
                    //then
                    //change the speed direction so it moves back up or down
                    speed = -speed;
                }
            }
            else
            {
                // if the score is greater than 5
                // then make the game difficult by
                // allowing the CPU follow the ball so it doesn't miss
                cpu.Top = ball.Top + 30;
            }
```

This is where we are setting up difficulty for the game. IF the overall score is less than 5 then CPU will move randomly up and down. When the score is more than 5 in the ELSE statement we will move the CPU with the ball.

```
            //check the score
            // if the ball has gone pass the player through the left
            if (ball.Left < 0)
            {
                //then
                ball.Left = 434; // reset the ball to the middle of the screen
                ballx = -ballx; // change the balls direction
                ballx -= 2; // increase the speed
                cpuPoint++; // add 1 to the CPU score
            }
```

This if statement above will determine if the ball has reached the far left side of the screen then we will reset the ball, increase the speed on the negative direction and increase the speed of the ball and add 1 to the CPU Score.

```
            if (ball.Left + ball.Width > ClientSize.Width)
            {
                // then
                ball.Left = 434;  // set the ball to centre of the screen
                ballx = -ballx; // change the direction of the ball
                ballx += 2; // increase the speed of the ball
                score++; // add one to the players score
            }
```

This if statement determines if the ball has reached the far right end of the screen meaning the player has scored then we will set the ball in the middle of the screen, reverse the balls direction and add 2 to the ball speed. Finally we will increase the player score.

```
            //controlling the ball
            // if the ball either reachers the top of the screen or the bottom
            if (ball.Top < 0 || ball.Top + ball.Height > ClientSize.Height)
            {
                // then
                //reverse the speed of the ball so it stays within the screen
                bally = -bally;
            }
```

This if statement will determine if the ball hits either the top or the bottom of the screen. Since we have linked the BALLY variable to the BALL.TOP property then we can simply reverse the speed of the ball when it hits either one of the boundaries.

```
            // if the ball hits the player or the CPU
            if (ball.Bounds.IntersectsWith(player.Bounds) || ball.Bounds.IntersectsWith(cpu.Bounds))
            {
                // then bounce the ball in the other direction
                ballx = -ballx;
            }
```

In this IF statement will determine if the ball hits the player or the CPU. Just as the we have the TOP and LEFT property in the picture boxes we also have something called BOUNDS. This allows us to check if a object is colliding with another. In this example if the BALL bounds intersects with PLAYER bounds then we will reverse the X direction of the ball and we will do the same when the ball collides with the CPU.

```
            // if go up boolean is true and player is within the top boundary
            if (goup == true && player.Top > 0)
            {
                // then
                // move player towards to the top
                player.Top -= 8;
            }
```

This IF statement will allow us to move the player if the go up Boolean is true and the player is still within the game boundary then we will continue to move the player towards the top.

```
            // if go down boolean is true and player is within the bottom boundary
            if (godown == true && player.Top < 455)
            {
                // then
                // move player towards the bottom of screen
                player.Top += 8;
            }
```

This if statement will allow us to move the player if the go down Boolean is true and the player is still within the game boundary then we will continue to move the player towards the bottom.

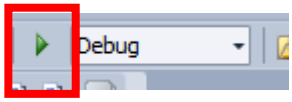
```
            // final score and ending the game
            // if the player score more than 10
            // then we will stop the timer and show a message box
            if(score > 10)
            {
                gameTimer.Stop();
                MessageBox.Show("You win this game");
            }
```

IF the player has scored more than 10 then we will stop the timer and show a message box saying you win the game.

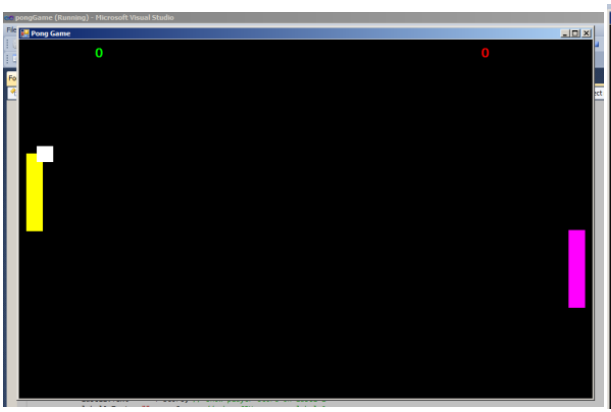
```
            // if the CPU scores more than 10
            // then we will stop the timer and show a message box
            if(cpuPoint > 10)
            {
                gameTimer.Stop();
                MessageBox.Show("CPU wins, you lose");
            }
```

IF the CPU has scored more than 10 then we will stop the timer and show a message box saying CPU wins and you lose.

Lets test the game out now



Click on the Debug button (The green play button) or press F5 to debug the game.



Game is working fine. If you get any errors in the errors log, refer back to this tutorial and see which line the error is coming up.

Source code -

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;

namespace pongGame
{
    public partial class Form1 : Form
    {

        bool goup; // boolean to be used to detect player up position
        bool godown; // boolean to be used to detected player down position
        int speed = 5; // integer called speed holding value of 5
        int ballx = 5; // horizontal X speed value for the ball object
        int bally = 5; // vertical Y speed value for the ball object
        int score = 0; // score for the player
        int cpuScore = 0; // score for the CPU

        public Form1()
        {
            InitializeComponent();
        }

        private void gameTimer(object sender, EventArgs e)
        {
            // this is the main timer event, this event will trigger every 20 milliseconds
```

```
            label1.Text = "" + score; // show player score on label 1
            label2.Text = "" + cpuScore; // show CPU score on label 2

            ball.Top -= bally; // assign the ball TOP to ball Y integer
            ball.Left -= ballx; // assign the ball LEFT to ball X integer

            cpu.Top += speed; // assignment the CPU top speed integer

            // if the score is less than 5
            if (score < 5)
            {
                // then do the following

                // if CPU has reached the top or gone to the bottom of the screen
                if (cpu.Top < 0 || cpu.Top > 455)
                {
                    //then
                    //change the speed direction so it moves back up or down
                    speed = -speed;
                }
            }
            else
            {
                // if the score is greater than 5
                // then make the game difficult by
                // allowing the CPU follow the ball so it doesn't miss
                cpu.Top = ball.Top;
            }


            //check the score
            // if the ball has gone pass the player through the left
            if(ball.Left < 0)
            {
                //then
                ball.Left = 434; // reset the ball to the middle of the screen
                ballx = -ballx; // change the balls direction
                ballx -= 2; // increase the speed
                cpuScore++; // add 1 to the CPU score
            }

            // if the ball has gone past the right through CPU

            if(ball.Left + ball.Width > ClientSize.Width)
            {
                // then
                ball.Left = 434;  // set the ball to centre of the screen
                ballx = -ballx; // change the direction of the ball
                ballx += 2; // increase the speed of the ball
                score++; // add one to the players score
            }

            //controlling the ball
            // if the ball either reachers the top of the screen or the bottom
            if(ball.Top < 0 || ball.Top + ball.Height > ClientSize.Height )
            {
                // then
                //reverse the speed of the ball so it stays within the screen
                bally = -bally;
            }


            // if the ball hits the player or the CPU
            if(ball.Bounds.IntersectsWith(player.Bounds) || ball.Bounds.IntersectsWith(cpu.Bounds))
            {
                // then bounce the ball in the other direction
                ballx = -ballx;
            }

            // controlling the player

            // if go up boolean is true and player is within the top boundary
            if(goup == true && player.Top > 0)
            {
                // then
                // move player towards to the top
                player.Top -= 8;
            }

            // if go down boolean is true and player is within the bottom boundary
            if(godown == true && player.Top < 455)
            {
                // then
                // move player towards the bottom of screen
                player.Top += 8;
            }
        }

        private void keyisdown(object sender, KeyEventArgs e)
        {
            if(e.KeyCode == Keys.Up)
            {
                // if player presses the up key
                // change the go up boolean to true
                goup = true;
            }
            if(e.KeyCode == Keys.Down)
```

```
            {
                // if player presses the down key
                // change the go down boolean to true
                godown = true;
            }
        }

        private void keyisup(object sender, KeyEventArgs e)
        {
            if (e.KeyCode == Keys.Up)
            {
                // if player leaves the up key
                // change the go up boolean to false
                goup = false;
            }
            if (e.KeyCode == Keys.Down)
            {
                // if player leaves the down key
                // change the go down boolean to false
                godown = false;
            }
        }
    }
}
```