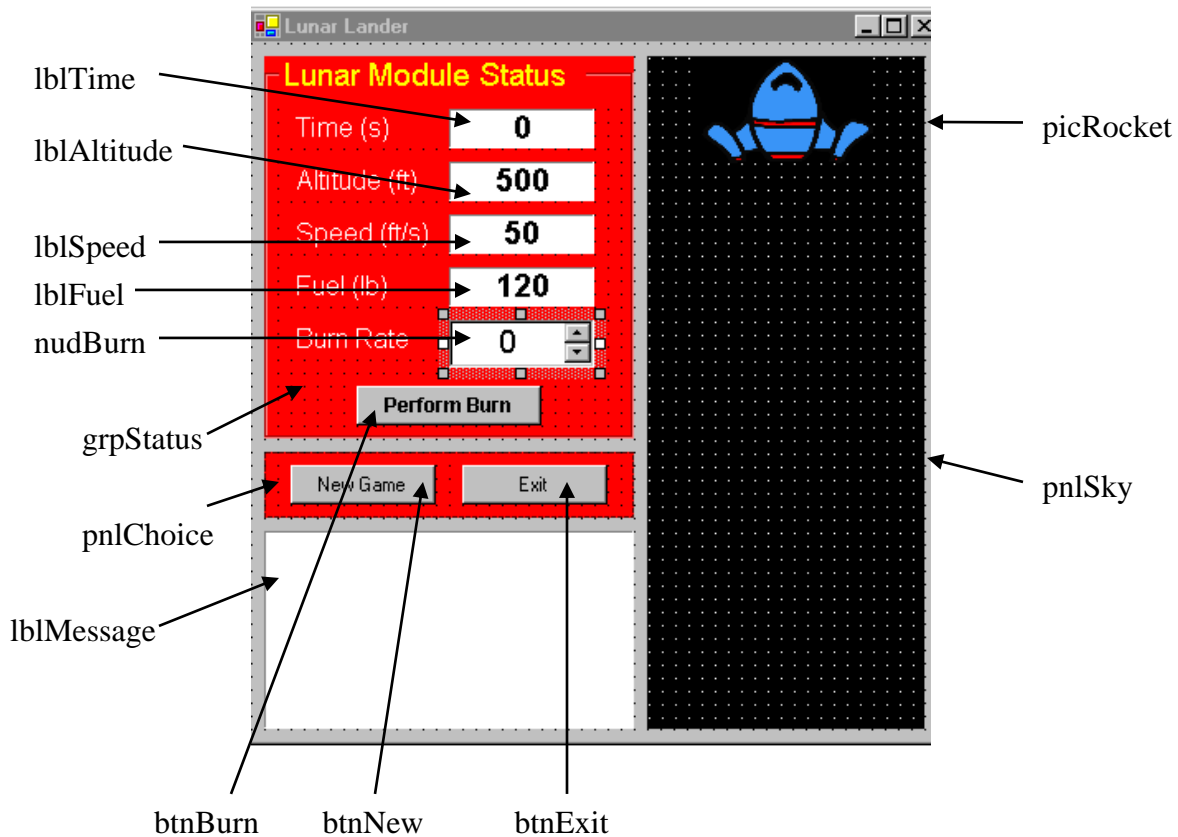## Lunar Lander Game

In this project you will construct a Lunar Lander game.

1. Create a new project and create the interface as shown above.

2. Add the following to the Form1_Load Sub:

```
//Create introductory message
lblMessage.Text = "You are landing on the moon and have taken over" +
"manual control of the lunar module." +
   "You are 500 feet above a good landing spot." + Environment.NewLine +
   "Good luck!";
lblMessage.Text += lblMessage.Text + Environment.NewLine +
   ">>Click New Game To Start<<";
btnNew.Focus();
```

3. Create the following global variables:

```
//Declare global variables
bool gameOver;
double T, H, V, F, B, V1;
```

4. Add the following to the btnNew_Click event:

```
gameOver = false;
lblMessage.Text = "";
nudBurn.Enabled = true;
btnBurn.Enabled = true;
btnNew.Enabled = false;
btnExit.Text = "Stop";
T = 0; //Time
H = 500; //Altitude (feet)
DrawRocket();
V = 50; //Speed
F = 120; //Fuel
lblTime.Text = "0";
lblAltitude.Text = "500";
lblSpeed.Text = "50";
lblFuel.Text = "120";
nudBurn.Text = "0";
nudBurn.Value = 0;
nudBurn.Maximum = 30;
```

5. Add the following to the btnExit_Click event:

```
if (btnExit.Text == "Exit")
    this.Close();
else
{
    nudBurn.Enabled = false;
    btnBurn.Enabled = false;
    btnExit.Text = "Exit";
    btnNew.Enabled = true;
    if (!gameOver)
        lblMessage.Text = "Game Stopped";
    btnNew.Focus();
}
```

6. Add the following to the btnBurn_Click event:

```csharp
B = Convert.ToDouble(nudBurn.Value);
V1 = V - B + 5;
F = F - B;
H = H - 0.5 * (V + V1);
if (H > 0)
{
    DrawRocket();
    T = T + 1;
    V = V1;
    lblTime.Text = T.ToString("0");
    lblAltitude.Text = H.ToString("f1");
    lblSpeed.Text = V.ToString("0");
    lblFuel.Text = F.ToString("0");
    if (F > 0)
    {
        if (F < 30)
        {
            if (Convert.ToDouble(nudBurn.Value) > F)
                nudBurn.Value = Convert.ToInt32(F);
            nudBurn.Maximum = Convert.ToInt32(F);
        }
    }
    else
    {
        B = 0;
        nudBurn.Enabled = false;
        btnBurn.Enabled = false;
        lblMessage.Text = "Out of fuel!  In free-fall!";
        lblMessage.Refresh();
        tmrFalling.Enabled = true;
    }
}
else
{
    nudBurn.Enabled = false;
    btnBurn.Enabled = false;
    Landed();
}
```

7. Add the following to the tmrFalling_Tick event:

```csharp
V1 = V + 5;
H = H - 0.5 * (V + V1);
if (H <= 0)
{
    H = 0;
    tmrFalling.Enabled = false;
    Landed();
}
else
{
    T = T + tmrFalling.Interval / 1000;
    DrawRocket();
    V = V1;
    lblTime.Text = T.ToString("0");
    lblTime.Refresh();
    lblAltitude.Text = H.ToString("f1");
    lblAltitude.Refresh();
    lblSpeed.Text = V.ToString("0");
    lblSpeed.Refresh();
}
```

8. Write a Landed function:

```csharp
//This method evaluates your landing
private void Landed()
{
        double D;

        //Final results
        gameOver = true;
        H = 0;
        DrawRocket();
        if (B != 5)
                D = (-V + Math.Sqrt(V * V + H * (10 - 2 * B))) / (5 - B);
        else
                D = H / V;

        V1 = V + (5 - B) * D;
        lblTime.Text = (T + D).ToString("f1");
        lblAltitude.Text = "0.0";
        lblSpeed.Text = V1.ToString("f1");
        lblFuel.Text = F.ToString("0");
        lblMessage.Text = "Touchdown at " + T.ToString("f2") + " seconds." +
                Environment.NewLine;
```

```csharp
            lblMessage.Text += "Landing velocity is " + V1.ToString("f2") + "
                    ft/sec." + Environment.NewLine;
            lblMessage.Text +=  F.ToString("0") + " units of fuel remain." +
                    Environment.NewLine + Environment.NewLine;;

            if (V1 <= 2)
                    lblMessage.Text += "Congratulations! A perfect landing!";
            else if ((Math.Abs(V1)) <= 10)
                    lblMessage.Text += "You inflicted some craft damage. You are" +
                            "stranded until a rescue ship arrives.";
            else
                    lblMessage.Text += "You blew it! " +
                            "Condolences will be sent to the next of kin.";
            btnExit.PerformClick();
        }
```

9. Write a DrawRocket Sub procedure:

```csharp
        private void DrawRocket()
        {
                picRocket.Top = Convert.ToInt32((pnlSky.Height - picRocket.Height) *
                        (1 - H / 500));
        }
```

10. Now test your program and see if it works.