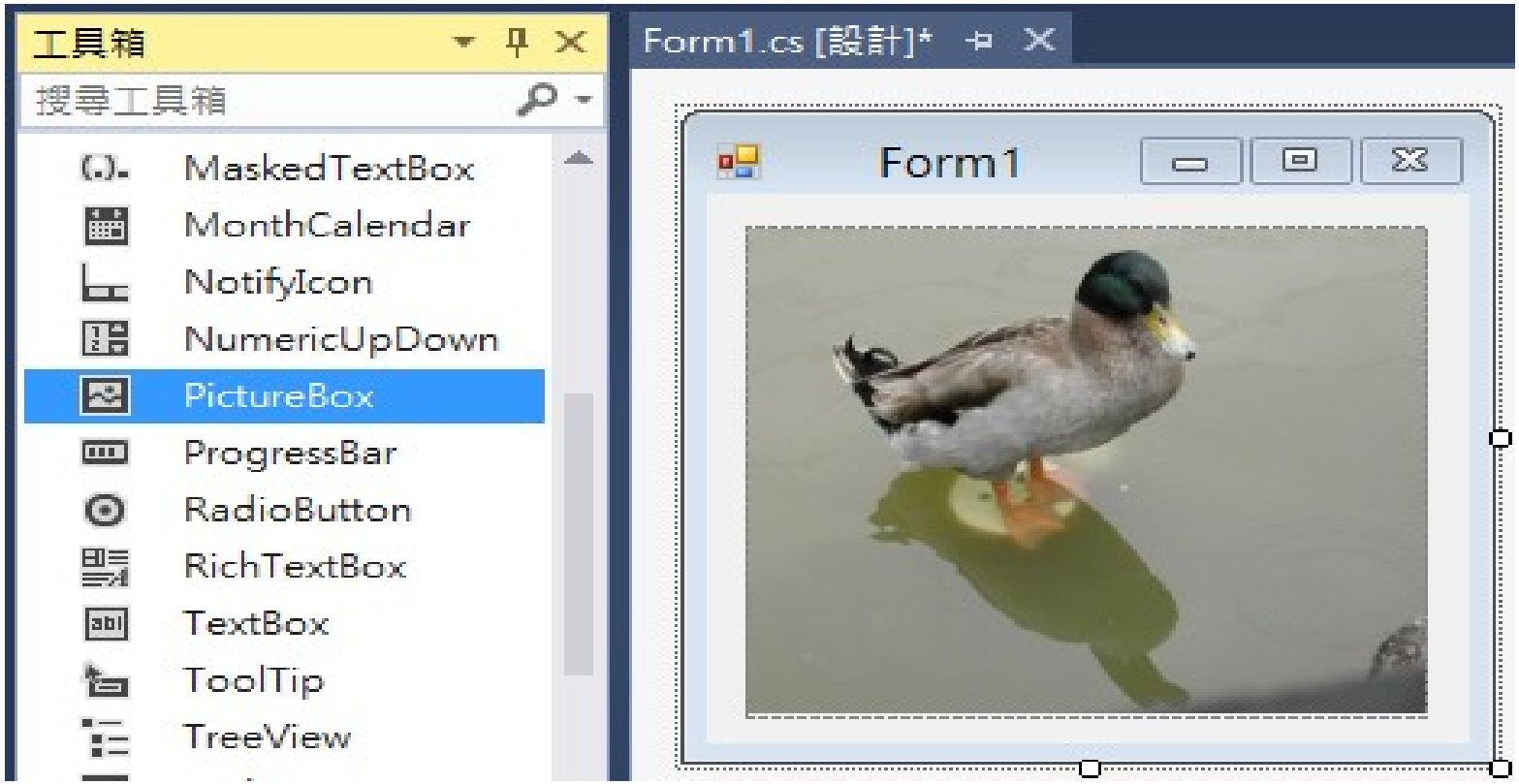
Chapter 7

Windows Basic Control Item

7-1 PictureBox Control Item

- **Usage**
  - ⇨ **draw graph or load image**
  - ⇨ **show animation**



PictureBox Properties

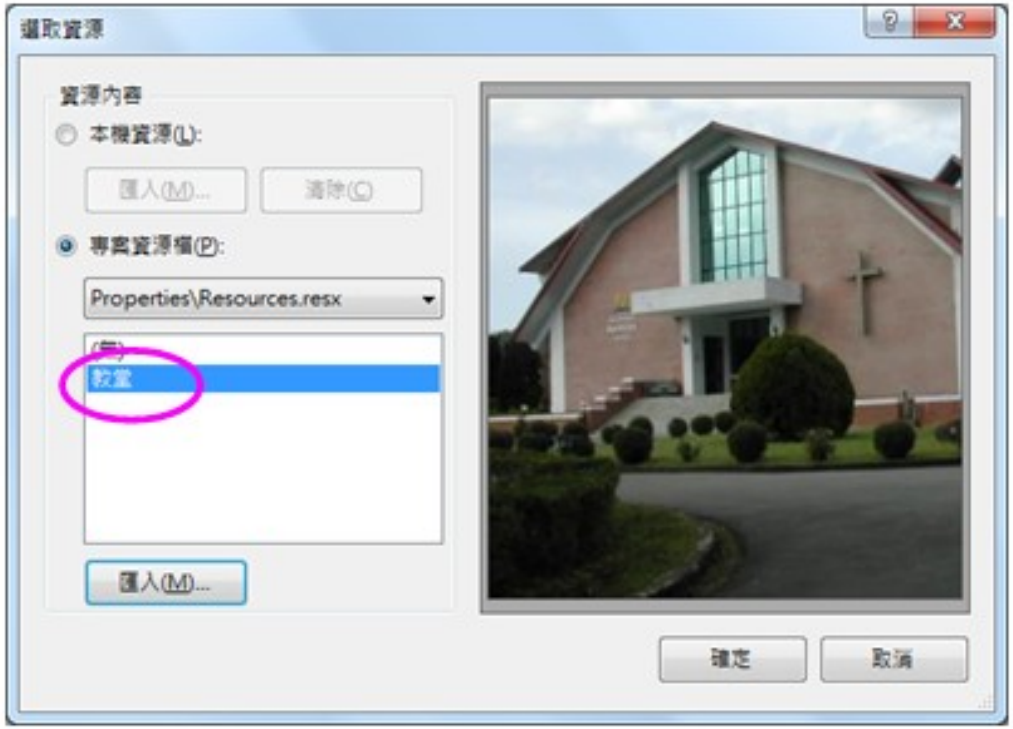
Property	Description
Image	Assign image file name
BorderStyle	None: no border (default) FixedSingle: single line Fixed3D: 3-D line
Location.X	The horizontal coordinates of the upper-left corner of the control relative to the upper-left corner of its container
Location.Y	The vertical coordinates of the upper-left corner of the control relative to the upper-left corner of its container
Size.Width	PictureBox's width (can be abridged as Width)
Size.Height	PictureBox's height (can be abridged as Height)

Property	Description
SizeMode	Normal: The image is placed in the upper-left corner of the PictureBox. (default) StretchImage: The image is stretched or shrunk to fit the size of the PictureBox. AutoSize: The PictureBox is sized equal to the size of the image CenterImage: The image is displayed in the center Zoom: The size of the image is increased or decreased maintaining the size ratio. Ex: pic.SizeMode = PictureBoxSizeMode.Zoom;

3. Image Format of PictureBox

- **Acceptable image format:**
  Bitmap、GIF、JPEG、PNG…etc.
- **Bitmap(.bmp) is an uncompressed bitmap image**
- **GIF(.gif) only contains 256 colors; animation and transparency is acceptable**
- **JPEG(.jpg) is a compressed bitmap image**
- **PNG(.png) combines the characteristics of GIF and JPEG**

Set Image File in Design Phase



CAUTION: Click on “本機資源” option, the chosen image file cannot be copied to project directory. Users have to copy image files separately if the project directory is copied. If “專案資源檔” is chosen, no additional duplication is required

PictureBox Methods

Method	Description
Image.FromFile or new Bitmap	Load image file with full path when program is running Pic.Image = Image.FromFile(@"D:\fig\ex1.jpg"); or Pic.Image = new Bitmap(@"D:\fig\ex1.jpg"); Ps: @"D:\fig\ex1.jpg" can also be written in "D:\\fig\\ex1.jpg"
Point() constructor	Move PictureBox object to the specific X-Y coordinate Ex1: pic.Location = new Point(50, 100); Ex2: pic.Location = new Point(pic.Left – 5, pic.Top + 5); or pic.Left -= 5; pic.Top += 5;

Method	Description

Size()
constructor
	Set the width and height of the image
	Ex:
	pic.Size = new Size(pic.Width / 2, pic.Height / 2);
	or
	pic.Width /= 2; pic.Height /= 2;

Dispose()	Clear the content of PictureBox and release the memory space Ex: pic.Dispose(); or pic.Image = null;

Load Image at Runtime

1. Image and executable file are under the same directory:

```
① pic.Image = Image.FromFile ("教堂.jpg") ;
② pic.Image = new Bitmap ("教堂.jpg") ;
```

2. Image is at the parent directory of the executable file

```
① pic.Image = Image.FromFile (@"..\教堂.jpg") ;
② pic.Image = new Bitmap (@"..\教堂.jpg") ;
```

3. Image and project file is under the same directory:

```
① pic.Image = Image.FromFile (@"..\..\教堂.jpg") ;
② pic.Image = new Bitmap (@"..\..\教堂.jpg") ;
```

Image class

- **Make the file into the image class**

  Image myPic = Image.FromFile(@"**D:\fig\ex1.jpg**");

- **Make the image show in the pictureBox**

  pictureBox1.Image = myPic;

Example(PictureBox):

Design an image viewer, requirements:

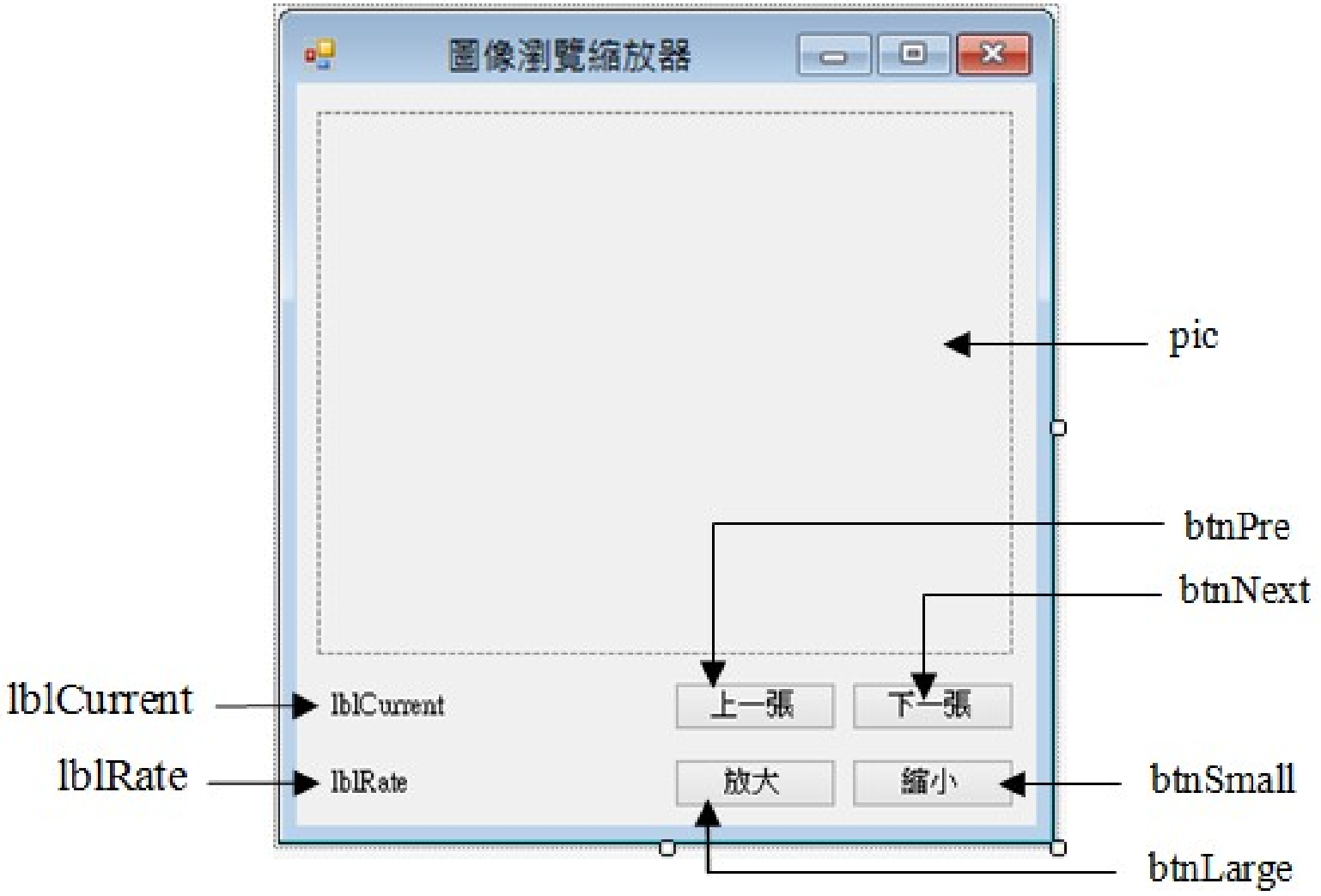
1. There are 6 images (pic1.jpg ~ pic6.jpg). The program starts and loads the first image. The property SizeMode is set to Zoom
2. Change the showing image when pressing “上一張” or “下一張”. If the current image is the first image, the button “上一張” is unavailable. If the current image is the last image, the button “下一張” is unavailable
3. Every time press “放大” button, the image is enlarged 10%, the maximum is 100%.
   Every time press “縮小” button, the image is shrunk 10%, the minimum is 10%.
   The program shows image in 80% when starting. The image’s center position is unchanged during zooming
4. Use lblCurrent label control item to show the order of images. Use lblRate label control item to show the rate of zooming

Result:


圖像瀏覽縮放器
第 6 張圖像
上一張
下一張
圖像顯示比例：90 %
放大
縮小


圖像瀏覽縮放器
第 3 張圖像
上一張
下一張
圖像顯示比例：60 %
放大
縮小

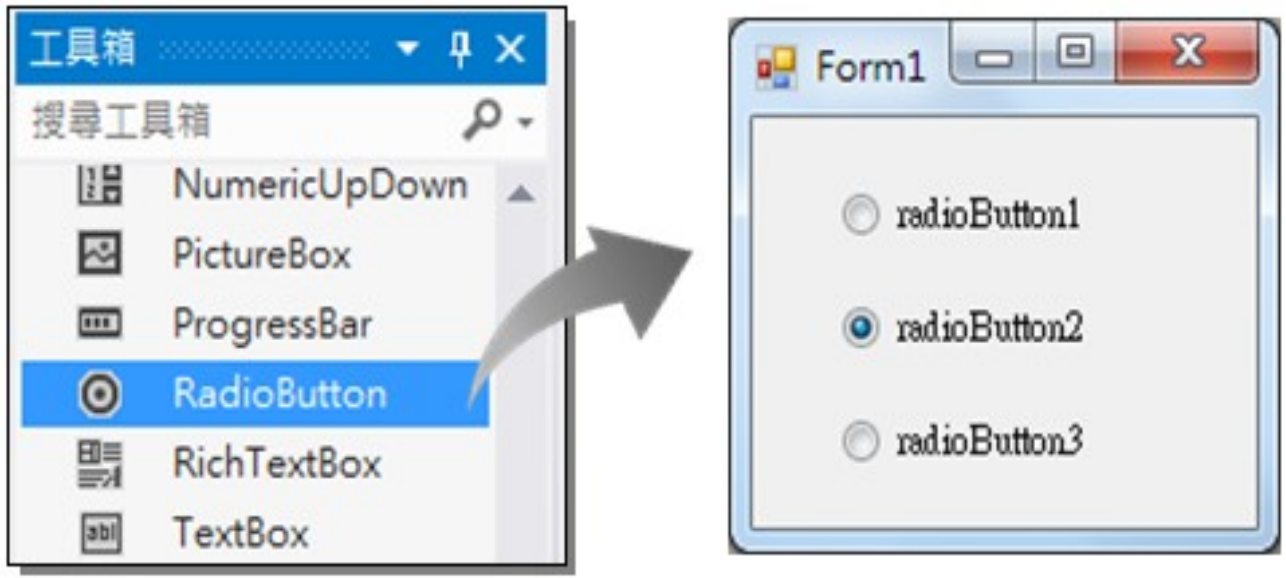
Design User Interface



7-2 RadioButton Control Item

Usage:

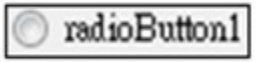
there are many related options and only a single choice is allowed



2 choices 5 choices 7 choices

RadioButton Properties

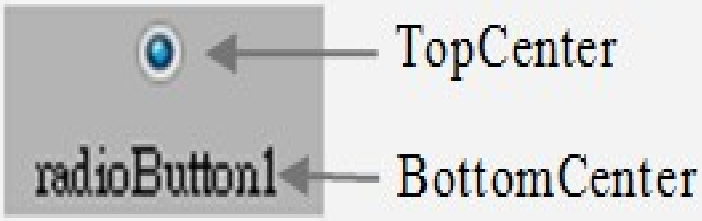
Property	Description
Checked	False: not selected (default) True: selected Usage: radiobutton1.Checked = true;
AutoCheck	True: Checked property can be selected automatically as clicked False: Checked property cannot be selected automatically as clicked Usage: radioButton1.AutoCheck = true;

Text	Set the showing text of the control item Usage: radioButton1.Text = “University”; 
TextAlign	Set the alignment of the control item’s showing text. Notice: AutoSize property has to be False TopLeft TopCenter TopRight MiddleLeft MiddleCenter MiddleRight BottomLeft BottomCenter BottomRight  Usage: radioButton1.TextAlign = ContentAlignment.MiddleRight;
Appearance	Normal: small circle button and text (default)  Button: text surrounded by a frame  Usage: radioButton1.Appearance = Appearance.Button;
CheckAlign	Set the alignment of small circle button when Appearance = Normal, 9 position like TextAlign property

Ex:

set the alignment of radioButton1's circle button TopCenter and the text's alignment BottomCenter

```
radioButton1.AutoSize = false;
radioButton1.Width = 100;
radioButton1.Height = 40;
radioButton1.CheckAlign = ContentAlignment.TopCenter;
radioButton1.TextAlign = ContentAlignment.BottomCenter;
```



RadioButton Events

1. **CheckedChanged**
   - ⇨ **default event**
   - ⇨ **triggered when mouse clicked or Checked changed**
   - ⇨ **if the radio button is already checked and mouse clicks – no event triggered because the value of Checked keeps True**
2. **Click**
   triggered when the radio button is clicked

Example(RadioButton):

Design a program for computing 4 fundamental operations of arithmetic, requirements:

1. Choose a manner to calculate. After entering numbers and pressing “=” button, show the result
2. Use Label control item to show the result. Properties:
   ① Background color: DarkRed
   ② Foreground color: White
   ③ Font size: 14pt
3. Label and TextBox control items align text to center
4. If 2 TextBoxs’ value are not number as the “=” button is pressed, use try…catch statement to handle the exception and show the error message “請輸入數值!”
5. Digits after the floating point are not limited
6. The divisor cannot be 0 when using division. Show error message “除數不能為零” if the divisor is 0

Result:

Design User Interface

7-3 CheckBox Control Item

- Single choice, multi choices and no choice are allowed
- As a check box is checked
  - ⇨ property Checked becomes True
  - ⇨ other check boxes are not affected
- If click on the checked check box
  - ⇨ become unchecked
  - ⇨ property Checked becomes False

CheckBox Properties

Property	Description
Checked	False: unchecked (default)  True: checked 
ThreeState	True: 3 states: Checked  , Unchecked  , Indeterminate  False: 2 states: Checked, Unchecked (default)
CheckState	Set the current state of the check box according to ThreeState property 3 property values: Unchecked (default), Checked, Indeterminate

2. CheckBox Events

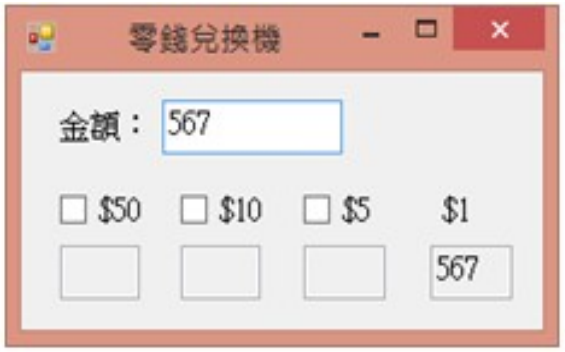
1. CheckedChanged
   - ⇨ default event of CheckBox
   - ⇨ triggered when Checked changes value
2. CheckStateChanged
   triggered when CheckState changes value
3. Click
   triggered when mouse click on the check box

Example(exchange):

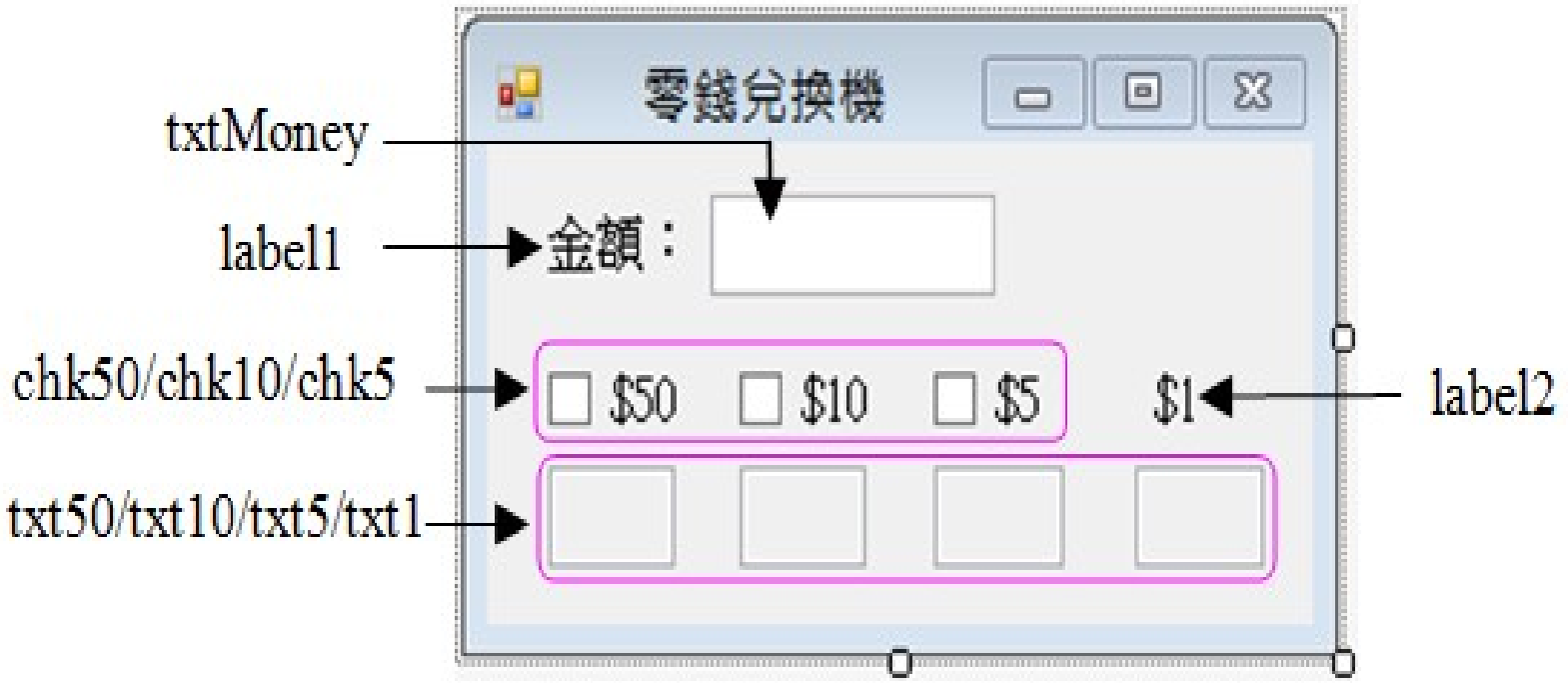
Design a change exchanger, requirements:

1. The check boxes of 3 types of change is unchecked when the program starts. $1 is a necessary type. 4 TextBoxes for showing result is set read-only
2. Users can input the number of money and select the type of change they want

3. The program automatically shows the number of changes in TextBoxes. Use only $1 to get all of money if no other types of change is selected
4. Automatically show the number of changes when the option of change is checked. Show 0 if there is no input namber
5. Input number can only be unsigned integer. Show the error message as the figure if the format of input number is not fit



User Interface



Example(order):

Design a 3C shopping program, requirements:

1. Check products, enter the quantities, then press “結帳” button to get the total amount of money
2. When the form loads, set properties of the control item used to show total amount of money:
   ① Foreground color: Color.Red
   ② Background color: Highlight
   ③ Font: 標楷體
   ④ Font size: 14pt
   ⑤ Font style: italic
   ⑥ The total amount of money has a prefix “NT$”, use ToString(“#,#”) to show formatted number
   ⑦ Default: iPad2 check box is checked
3. Use text box for quantity input, default value is 1. Show error message “請輸入正整數值!” when the user inputs non-number character. Show error message “不能為負整數值!” when the user inputs minus number

4. Use check boxes to show products, only one option is selected in the same time. If one product is checked, other products cannot be checked. Keep checked when click on checked check box, uncheck the checked check box when the use chooses other check box.
5. When press “結帳” button, the label control item shows a message like “你購買 iPad Mini 共 2 台，共計 NT$ 21,000 元” if the number of quantity is right.

Result:


3C 購物中心
Apple 系列產品
數量
iPad2 ($12,500元)
2
iPad Mini ($10,500元)
iPhone 5 ($21,900元)
結帳
你購買 iPad Mini 2台 共計:NT$21,000元


錯誤訊息
請輸入正整數值！
確定


錯誤訊息
不能為負整數值！
確定

User Interface

7-4 ImageList Control Item

- Can store images
- Available to control items which have ImageList property
- Non-visible control item – run in background
- Acceptable image formats:
  BMP, GIF, ICO, JPG, PNG, etc.
- Control items with ImageList property:
  Button, CheckBox, Label, ListView, RadioButton, etc.

Use Images of ImageList

1. The control items which have ImageList property can use images of ImageList, e.g.: Button, Label

Usage:

① assign ImageList control item to ImageList property

② then assign the index of image to ImageIndex

Ex: show the 1st image of imgCars on btnCar Button

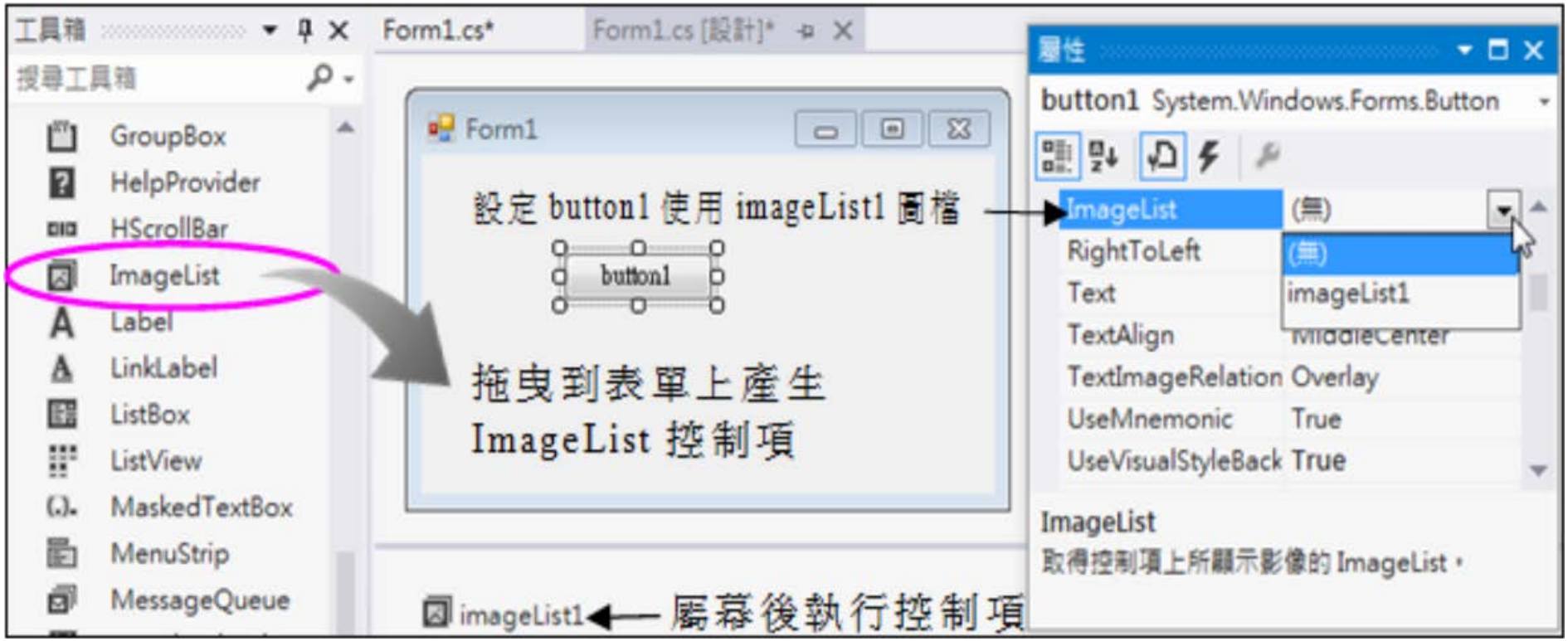
```
btnCar.ImageList=imgCars ;

btnCar.ImageIndex=0 ;
```

2. The control items which have Image property can use Images property of ImageList to get images, e.g.: PictureBox

Ex: show the 1st image of imgCars on picCar button

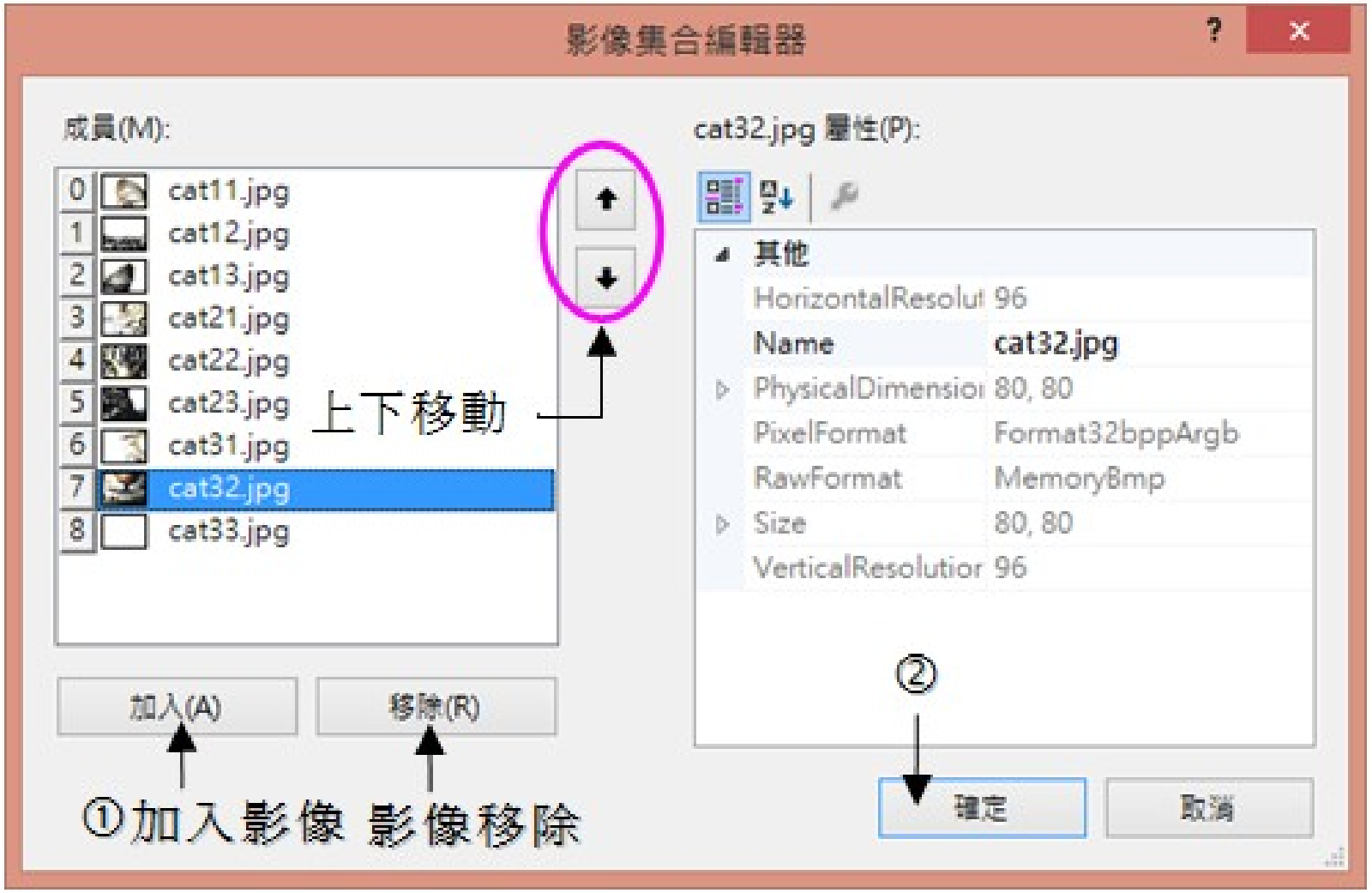
```
picCar.Image=imgCars.Images[0];
```


工具箱
搜尋工具箱
GroupBox
HelpProvider
HScrollBar
ImageList
Label
LinkLabel
ListBox
ListView
MaskedTextBox
MenuStrip
MessageQueue
Form1.cs*
Form1.cs [設計]*
Form1
設定 button1 使用 imageList1 圖檔
button1
拖曳到表單上產生
ImageList 控制項
imageList1
← 屬幕後執行控制項
屬性
button1 System.Windows.Forms.Button
ImageList
(無)
RightToLeft
(無)
Text
imageList1
TextAlign
TextImageRelation
Overlay
UseMnemonic
True
UseVisualStyleBack
True
ImageList
取得控制項上所顯示影像的 ImageList。

ImageList Properties

Property	Description
Images	Save the collection of ImageList Ex: assign Image of picShow PictureBox to be the 1st image of imgPic ImageList picShow.Image = imgPic.images[0];
ColorDepth	Set color bits of saved images, values: Depth4Bit, Depth8Bit(default), Depth16Bit, Depth24Bit, Depth32Bit
ImageSize	Set the width and height of saved images The maximum is 256, default is 16

Add Image in ImageList



ImageList Methods

1. Add() method
   add a new image after the end of image collections

Grammar
controlItemName.Images.Add(new Bitmap(imageFile));

Ex: add C:\cat1.bmp to imgCats ImageList, usage:

```
imgCats.Images.Add(new Bitmap("c:\\cat1.bmp"));
```

2. Clear() method
remove all images from ImageList

Grammar
controlItemName.Images.Clear();

Ex: remove all images from imgCats ImageList, usage:

```
imgCats.Images.Clear();
```

3. RemoveAt() method
remove the image with the designated index

Grammar
controlItemName.Images.RemoveAt(index);

Ex: remove the 1st image from imgCats ImageList, usage:

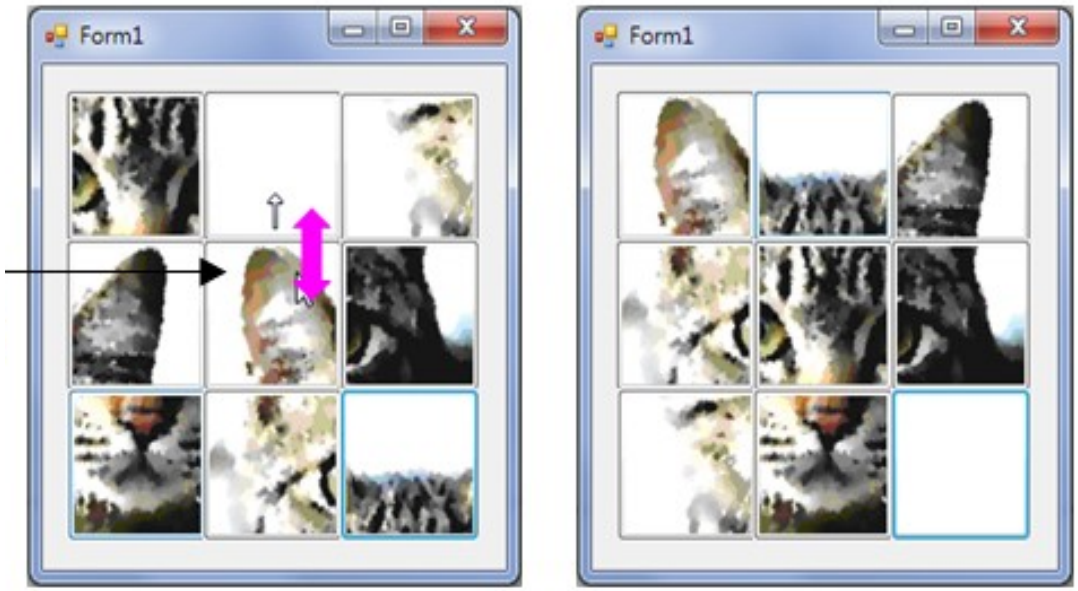
```
imgCats.Images.RemoveAt(0);
```

Example(puzzle):

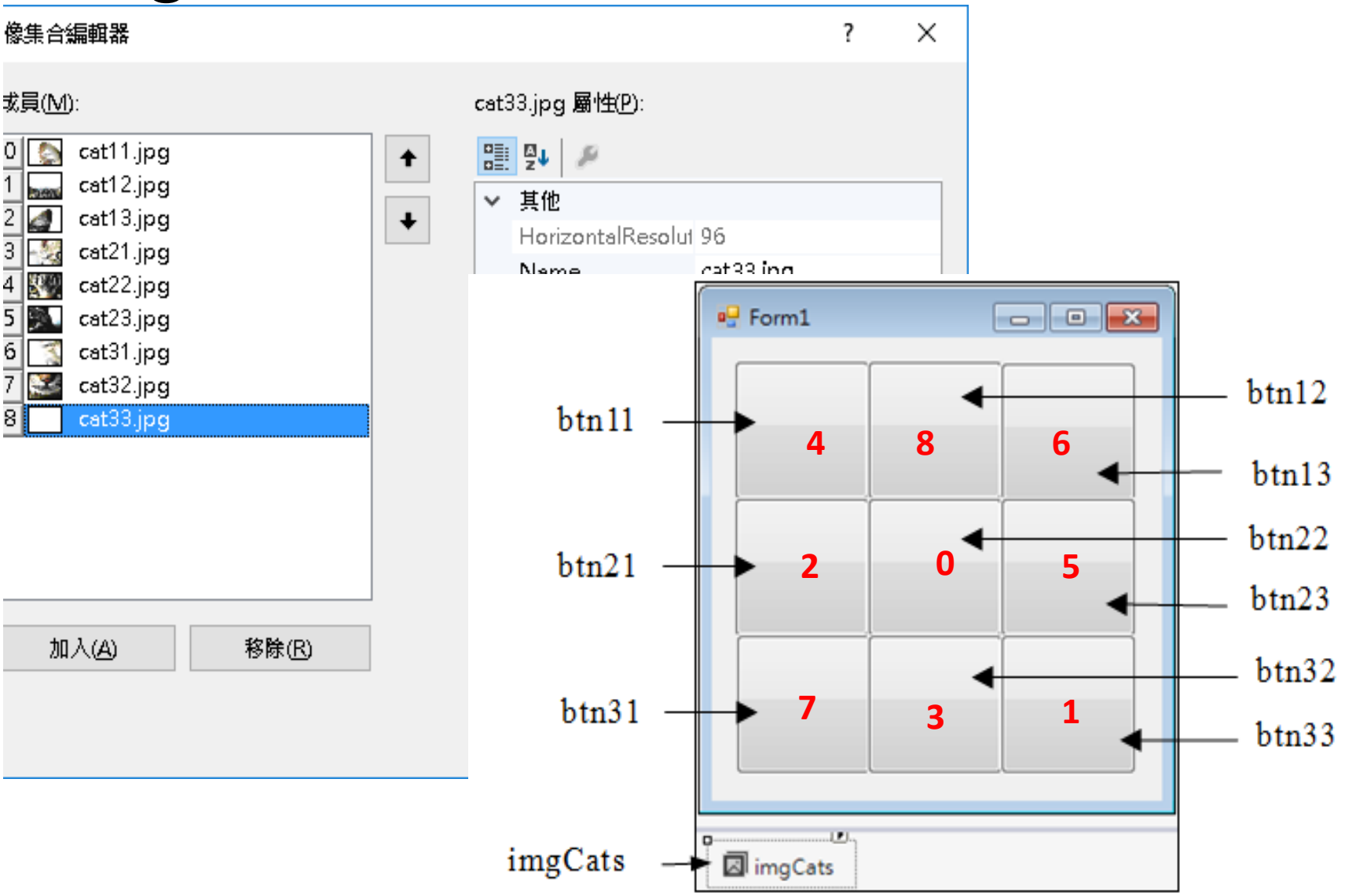
Design a movable puzzle game:

1. The picture of cat is divided into 9 parts. 8 parts are separated into 9 buttons when the program starts
2. Click on a button which has one part of cat's picture, the clicked button is exchanged with the blank button like the following figure.

Click and the picture is moved to the blank button

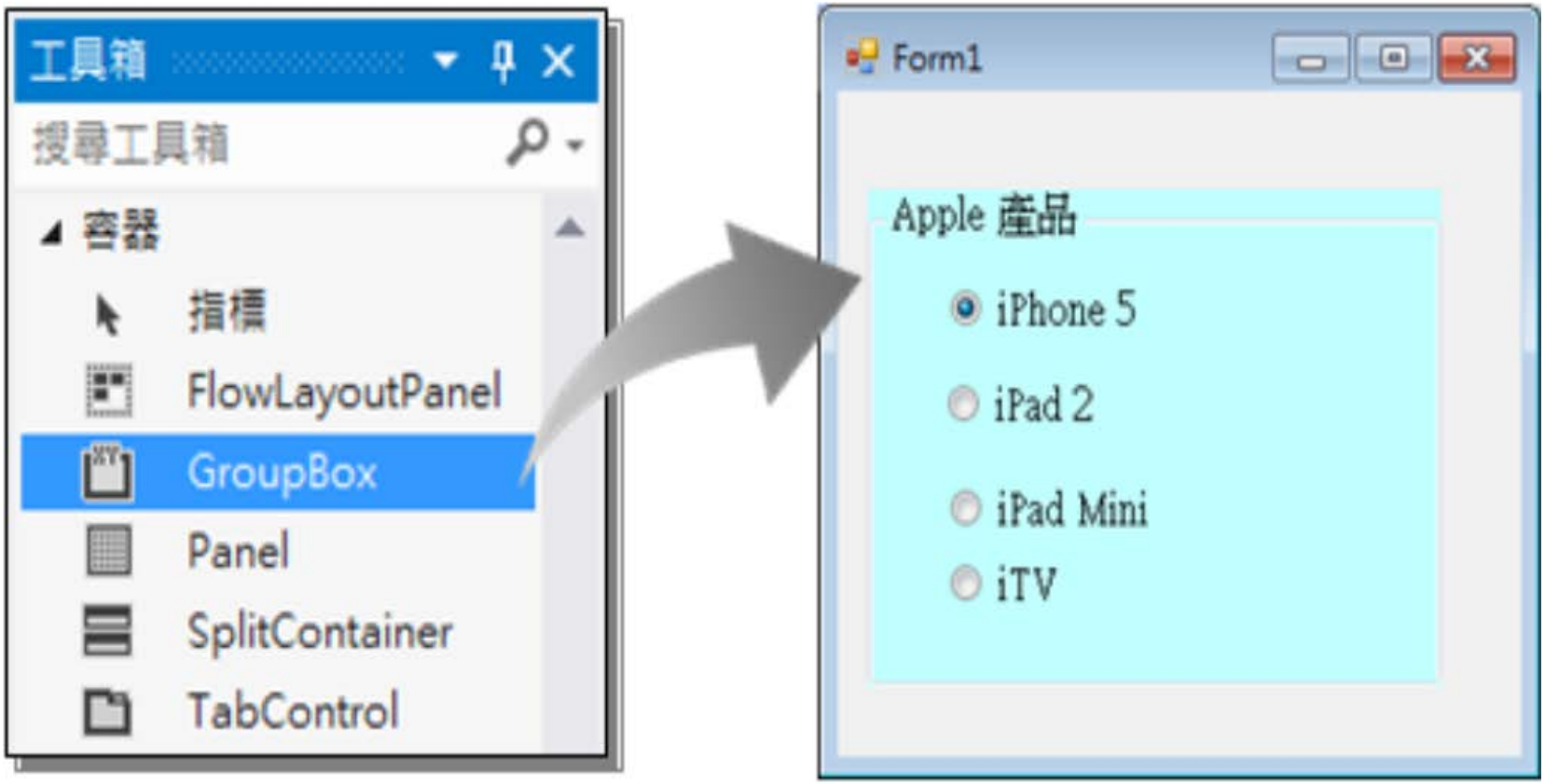


Design User Interface



7-5 GroupBox & Panel Control Item

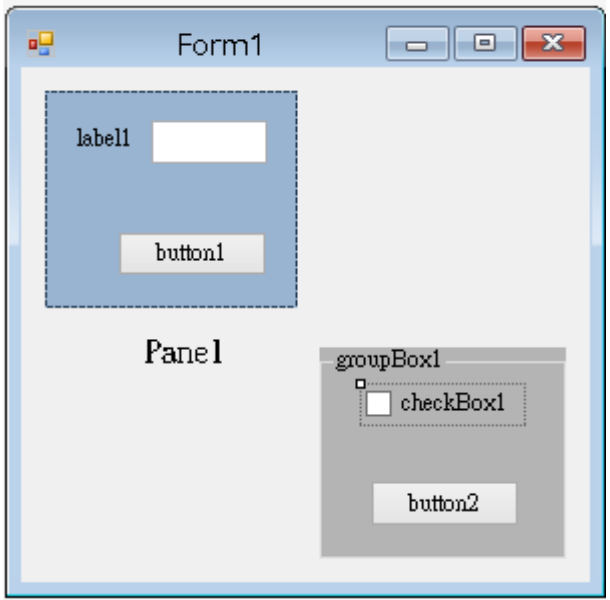
- The form contains control items – container
- Objects can be taken as a container in C#:
  Form, GroupBox, Panel, TabControl, etc.
- Characteristics of containers and included control items:
  1.container completely separates inner control items and outer control items
  2.the coordinator basis of inner control items is container
  3.inner control items move when the container is moved


工具箱
搜尋工具箱
容器
指標
FlowLayoutPanel
GroupBox
Panel
SplitContainer
TabControl
Form1
Apple 產品
iPhone 5
iPad 2
iPad Mini
iTV

Creation of the Panel

- A container can include control items
- No title text at the left-top corner of Panel
- GroupBox can have title text
- Panel can have scroll bars and include more control items, thus saving more form space than GroupBox
- AutoScroll = True,

Panel has scroll bars



Example(GroupBox):

Design a breakfast ordering program, requirements:

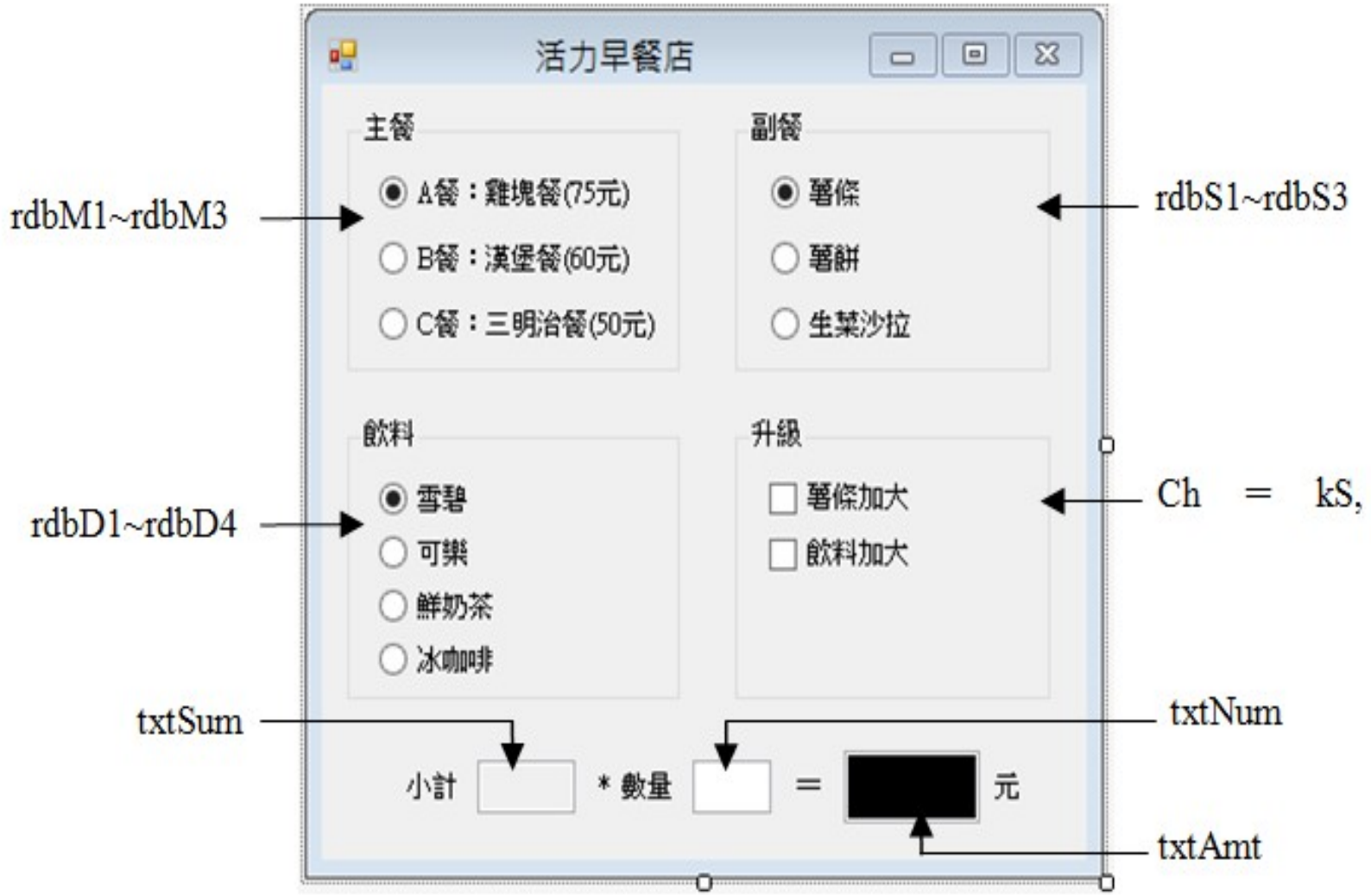
1. Choose the set and input the amount, then the pay is shown automatically
2. Each set has a main meal, a side dish and a drink.
3. If the side dish is fries, 5 dollars for "薯條加大" upgrade is available
   If the side dish is not fries, "薯條加大" upgrade check box is disabled and unchecked
4. Every drink has a 5-dollar upgrade "飲料加大"
5. When the program starts, default:
   ① Main meal is "1 號餐：雞塊餐(115 元)"
   ② Side dish is "薯條"
   ③ Drink is "汽水"
   ④ "薯條加大" upgrade and "飲料加大" upgrade are unchecked
6. Unit price field changes the value according the chosen items. Quantity field default value is 1. The total money field always shows the result of unit * quantity

Result:


活力早餐店
主餐
A餐：雞塊餐(75元)
B餐：漢堡餐(60元)
C餐：三明治餐(50元)
副餐
薯條
薯餅
生菜沙拉
飲料
雪碧
可樂
鮮奶茶
冰咖啡
升級
薯條加大
飲料加大
小計 75 * 數量 1 = 75 元

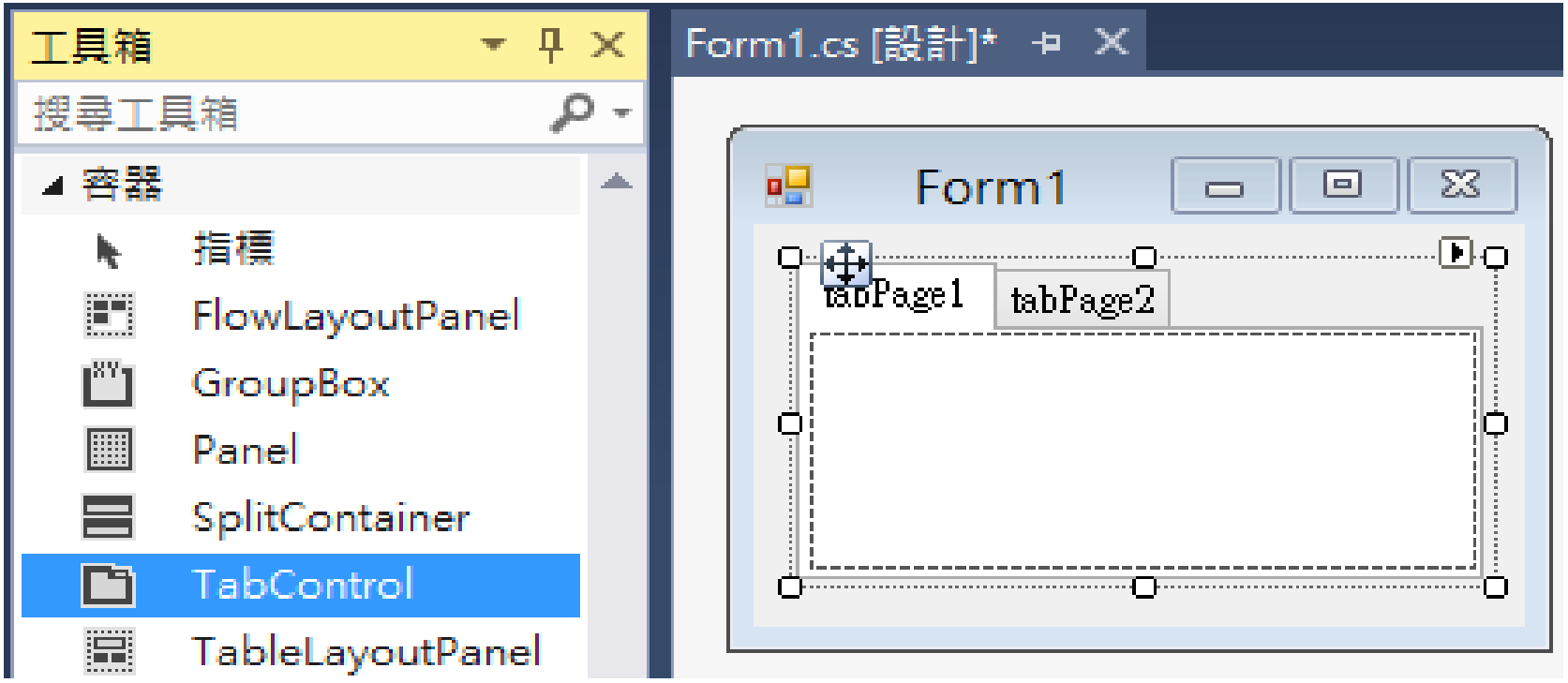

活力早餐店
主餐
A餐：雞塊餐(75元)
B餐：漢堡餐(60元)
C餐：三明治餐(50元)
副餐
薯條
薯餅
生菜沙拉
飲料
雪碧
可樂
鮮奶茶
冰咖啡
升級
薯條加大
飲料加大
小計 65 * 數量 3 = 195 元

Design User Interface



7-6 TabControl Control Item

- A container
- Can have many TabPage items
- Each tab can have other control items



Properties of TabControl

Property	Description
TabPages	Container of tab pages, includes every TabControls
Appearance	① Normal(**default**) ② Buttons ③ FlatButtons 
Multiline	False: show tab in single line (default) True: multi lines is accepted 

TabControl Methods

Method	Description
Add	Add a tab, usage: TabPage myTabPage = new TabPage("Drinks"); tabControl1.TabPages.Add(myTabPage);
Remove	Remove target tab, usage: Ex1: tabControl1.TabPages.Remove(myTabPage); Ex2: tabControl1.TabPages.Remove(tabControl1.SelectedTab);
Clear	Remove all tabs, usage: tabControl1.TabPages.clear();

TabControl Events

Method	Description
Click	Click event of TabPage object is triggered when click on tab's main content
SelectedIndexChanged	Triggered when the user clicks on tab title to change tab

e.g.

To make tabPage2 the working panel, use the following grammar: tabControl1.SelectedTab = tabPage2

Example(TabControl):

Use tab pages to design a breakfast ordering program, the function is identical to the previous practice.

1. TabControl has 4 tab panels, the titles are “主餐”, “附餐”, “飲料” and “升級”
2. There are 3 check box items called “A餐：雞塊餐(75 元)”, “B餐：漢堡餐(60 元)”, “C餐：三明治餐(50 元)” in the “主餐” tab panel.
3. There are 3 check box items called “薯條” and “薯餅”, ”生菜沙拉” in the “附餐” tab panel
4. There are 4 check box items called “雪碧”, “可樂”, “鮮奶茶” and “冰咖啡” in the “飲料” tab panel
5. There are 2 check box items called “薯條加大” and “飲料加大” in the “升級” tab panel

Result:

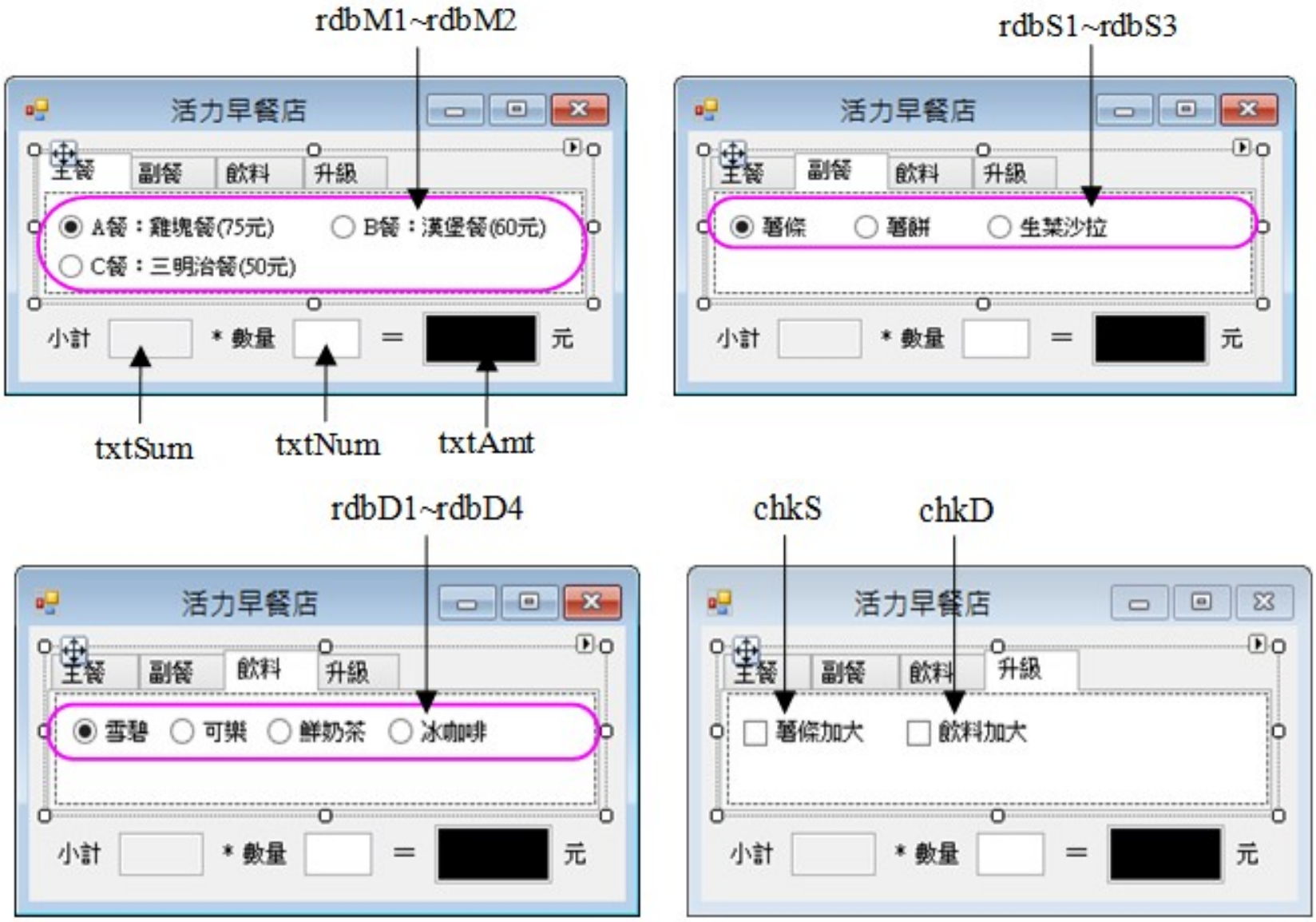

活力早餐店
主餐
副餐
飲料
升級
A餐：雞塊餐(75元)
B餐：漢堡餐(60元)
C餐：三明治餐(50元)
小計
75
* 數量
1
=
75
元


活力早餐店
主餐
副餐
飲料
升級
薯條
薯餅
生菜沙拉
小計
75
* 數量
1
=
75
元


活力早餐店
主餐
副餐
飲料
升級
雪碧
可樂
鮮奶茶
冰咖啡
小計
75
* 數量
1
=
75
元


活力早餐店
主餐
副餐
飲料
升級
薯條加大
飲料加大
小計
85
* 數量
2
=
170
元

User Interface



Math.Pow()

- Math.Pow()

he calculation raises the number to the exponent of other numbers.

- double power: exponent

- example:

Input ：base = 8, power =2
Output : 64

Input ：base = 2.5, power =3
Output : 15.625

```
// 6 is base and 2 is power or
// index or exponent of a number
double pow_ab = Math.Pow(6, 2);
// Print the result
Console.WriteLine(pow_ab);
// 3.5 is base and 3 is power or
// index or exponent of a number
double pow_tt = Math.Pow(3.5, 3);
// Print the result
Console.WriteLine(pow_tt);
```

Output：

36
42.875

The End

Take a Break