

《Computing Essentials》

Laboratory Manual

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Contents

Preface	3
Lesson1 Computer structure & Typing and Lan Configuration.....	4
Lesson2 PartI: Basic Concept of VPL (To build a Text-to-speech program)	5
Lesson3 PartII: Simulation Robotic Programming	8
Lesson4 PartI: Basic Concept of App Inventor	15
Lesson5 PartII: Building a Simple App (MoleMash)	20
Lesson6 Web pages Design	22
Lesson7 Course Design	33
References.....	34

Preface

In previous experimental course, the students are required to master the MS office and some other related issues. For several years' practice on this subject, we found that the students dislike the course. So we try to reform this experimental course

First, we call for students to know the architecture of computer, master the internal structure of personal computer. Secondly, they should be familiar with the method of typing Chinese and English, also be familiar with the operation and usage of Microsoft Visual Programming Language(MVPL) to control the simulated robotic and LEGO mindstorms . Then, be capable of applying the App inventor to create their APKs and to run them on their phone. At last, students need to know the making use of webpages tools like Dreamweaver and et al.

We replace the MS office operation in our experimental course with LEGO mindstorms and App inventor, the details are list as follows:

Computer structure & Typing and Lan Configuration. Students are required to finish three tasks in this experiment include observing the internal structure of PC, typing and construction& configuration of LAN based on the wireless AP.

PartI: Basic Concept of VPL and LEGO mindstorms. Control Simulation Robotics by Using Microsoft Visual Programming Language 4-PartI: Basic Concept of VPL and LEGO mindstorms.

PartII: Simulation Robotic Programming. Control Simulation Robotics by Using Microsoft Visual Programming Language 4-PartII: Simulation Robotic Programming.

PartI: Basic Concept of App Inventor. App Inventor to create APK(Android), PartI: Basic Concept of App Inventor.

PartII: Building a Simple App. Using App Inventor to create APK(Android), PartII: Building a Simple App.

Web pages Design. Web pages Design (Use vs2010 to build a simple asp.net web pages).

Course Design. To finish a course design from six given subject (like word, excel, webpages, flash and Photoshop, Ulead studio et al).

Thanks to the ASU University Prof.YL Chen. He provides us the VPE environment without any charge, and he also give much support to the construction of this course. We also give thanks to the Professor Chen Wenzhi, Zhejiang University, a professor of Computer Science to provide help for the construction of the curriculum.

At the same time, we should give thanks to all the teachers who have participate in curriculum reform of the lesson, they are Li Li, Yang Guocai, Yang Ming, Xie Zhong, Xiao Fuyuan, Li Yantao, Chen Huai Dong.

More information can be find in <http://venus.eas.asu.edu/WSRepository/ASU-VPL/>.

Lesson1 Computer structure & Typing and Lan Configuration

【OS & Software】

Windows 7/XP, Type Easy 2013

【Learning Outcomes】

Understand the internal structure of PC

Type correctly

Configure the wireless LAN

【Instructions】

1) Understand the internal structure of PC

Students should be able to:

1. Distinguish mainboard, CPU, RAM and PCI slots.
2. Distinguish Bios and Cmos.
3. Distinguish Graphics card.
4. Distinguish hard disk and solid disk.
5. Understand USB, keyboard, display port.

2) Chinese typing and English Typing

1. Typing correctly.
2. Typing with fast speed.

3) Configure the wireless Lan

1. To understand the basic way to configure WLAN.
2. Connect to the WLAN.

【Assessments】

No lab report is needed in this lesson.

Lesson2 PartI: Basic Concept of VPL (To build a Text-to-speech program)

【OS & Software】

Windows 7/XP、Microsoft Visual Programming Language 4、ASU Visual Programming Environment

【Learning Outcomes】

Be able to program in MVPL.

【Instructions】

1) Introduction to MVPL

1. Install MVPL.
2. Start MVPL.
3. To know the “Basic Activities”
4. To find out the services.
5. Drag with activities and connect with activities.

2) VPL activities

1. Be familiar with Variable、Calculate、Data、Join、Merge、If、Switch.
2. Understand the basic principle of “TexttoSpeechTTS”
3. Understand the basic principle of “SimpleDialog”.
4. Programming by using the aforementioned activities.

3) Complete the program of “TexttoSpeech”

1. A dialog should be output, and user must be writing a sentence.
2. Calculate the length of the input sentence, and read out.

【Instructions】

1) Introduction of VPL

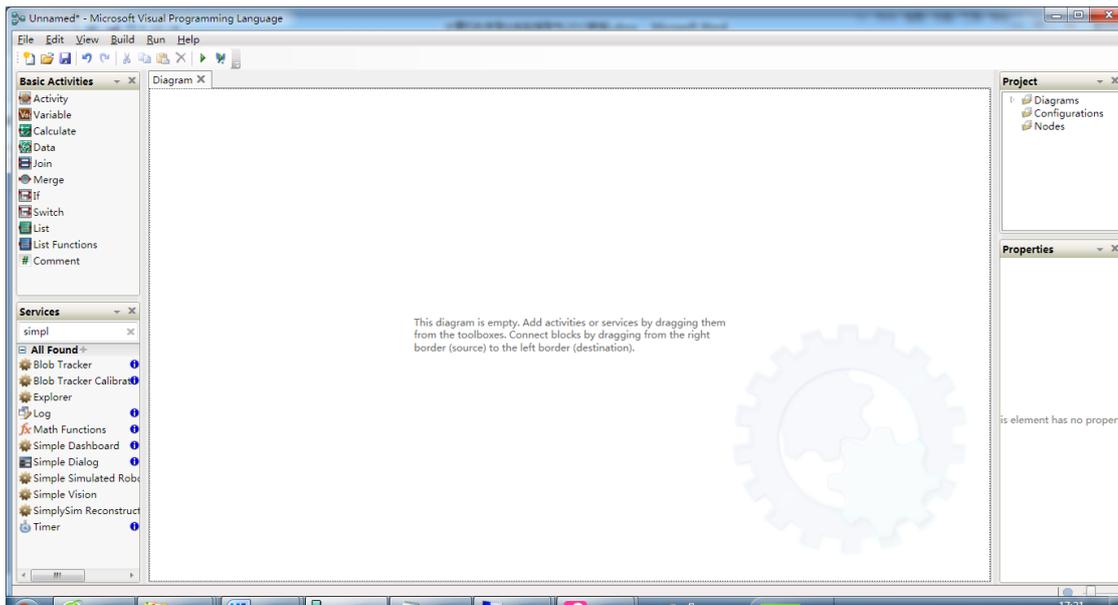
Microsoft VPL is a milestone in software engineering and robotics from many aspects. It is service oriented; it is workflow-based; it is event-driven; it supports parallel computing; and it is a great educational tool that is simple to learn and yet powerful and expressive.

Unfortunately, Microsoft stopped developing and supporting VPL recently, without

further support. Particularly, the current version of VPL does not support LEGO's third generation of EV3 robot, while the second generation NXT is out of the market.

To keep our course running and also help the other schools, we take the challenge and responsibility to ASU VIPLE supported by YINONG Chen.

1. Downloading from <http://172.18.5.98/CELesson-STU.rar> to get Microsoft Visual Programming Language 4.
2. Running Microsoft Robotics Developer Studio 4.exe.
3. Start-"Microsoft Visual Programming Language 4":



4. Introduction to functional areas:
Left side lays on Basic Activities, Services; panel is on the middle of the screen.

2) VPL Basic Activities

1. There are 10 basic activities that can be used for constructing programs. These activities are briefly explained in right Figure, and they will be exercised in the following programming exercises.

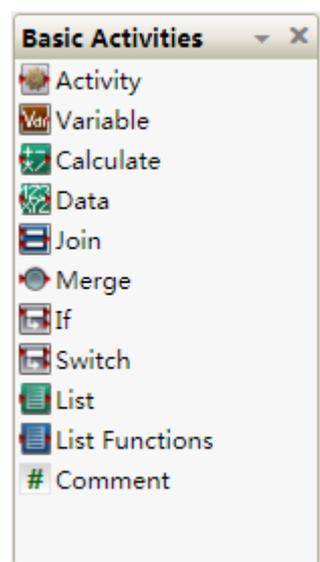
Activity: for creating components

Variable: supports basic types (Int32, Double, String, Boolean, etc.)

Calculate: Calculate the value of typical expression that is supported by C++, Java

Data: Introducing constant values in regular programming language

Join: proceeds when all threads arrive; Can be used for parallel data or threads.



Merge: proceeds when one of the data or threads arrives. It can be used for creating the return point of a loop;

If: same as regular programming language construct; It allows multiple conditions.

Switch: same as regular programming language construct;

While: start a loop; Break: exits a loop, and

End While: returns to While

2. The service of TexttoSpeechTTS can read out the input string.

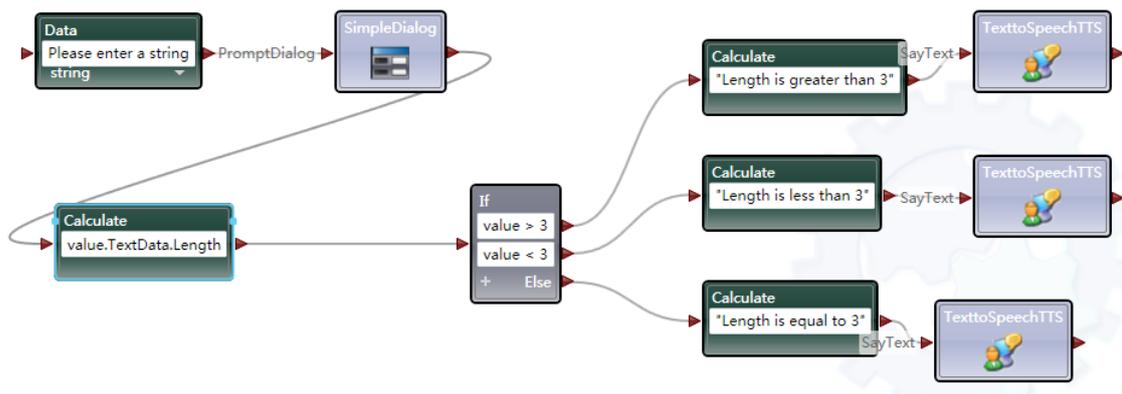


3. SimpleDialog could be used for tips or for input.



3) TexttoSpeech Program

Follow with the flowchart to complete the program.



Results:



【Assessments】

No lab reported is required.

But students should hand out (*.mvpl) with the name of ID and student name to the specify url.

Lesson3 PartII: Simulation Robotic Programming

【OS & Software】

Windows 7/X 、 Microsoft Visual Programming Language 4 、 ASU VisualProgrammingEnvironment

【Learning Outcomes】

Programming with VPL

Programming with VPL to control the simulating car

Using ASU VisualProgrammingEnvironment to control LEGO EV3 robotics

【Instructions】

1) MVPL (Microsoft Visual Programming Language 4) and simulating robotics

1. Programming with MVPL.
2. Running with the simulating car.
3. Control the car through the panel.

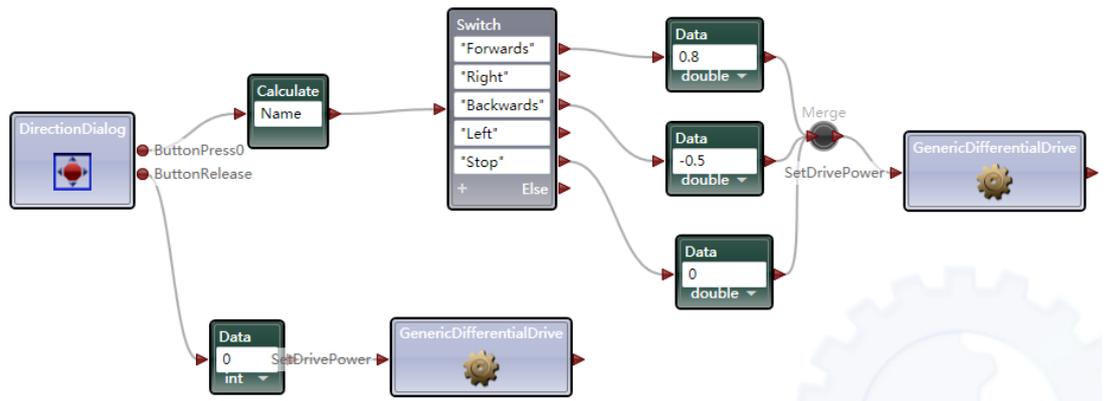
2) ASU VisualProgrammingEnvironment and LEGO EV3 robotics

1. Compare the difference between ASUVPE and MVPL.
2. How to power on LEGO EV3、 the connection on Bluetooth of LEGO EV.
3. Connect LEGO EV3 to PC.
4. Programming in group at most five people.
5. Writing a program to control LEGO EV3 by using the direction key.

【Instructions】

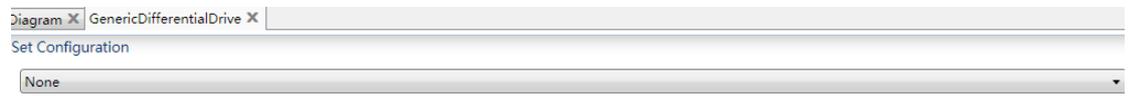
1) MVPL and Simulating car

1. Follow the flowchart to complete a program in MVPL(caution: the flowchart is not a complete one, you should to complete it by yourself)



2. Configure the running environment, click “Generic Differential Drive” as follows:

Double click “Generic Differential Drive” icon, and then:



Choose “Use a manifest” from the dropdownlist.



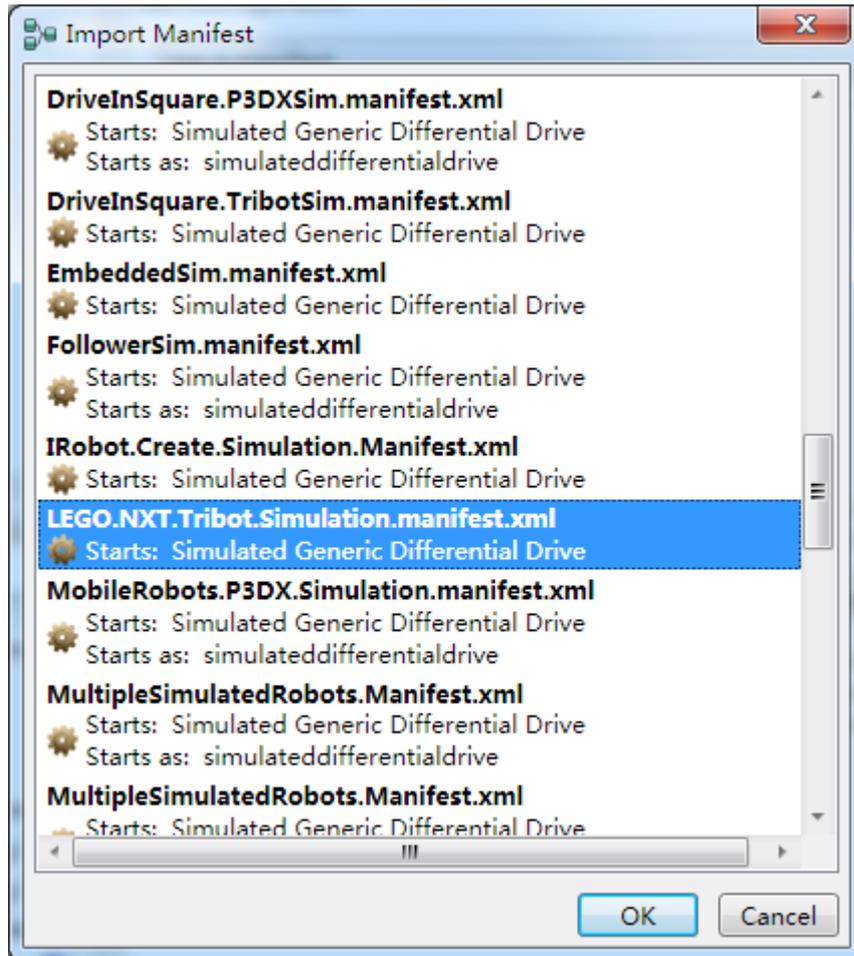
Use a manifest

A manifest contains a list of services that are started together. Use the dropdown list to select a service suitable to associate with this activity.

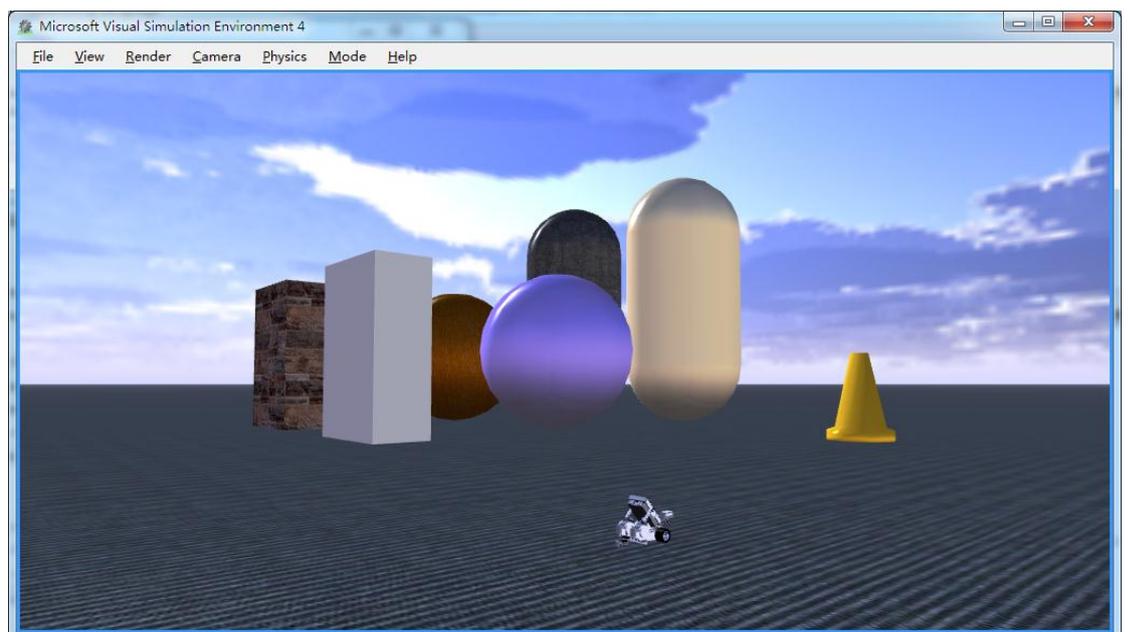


Import Manifest... To use a manifest, the manifest (and its configuration files) must be included in this project. Use the Import Manifest command to copy all necessary file into the project's folder.

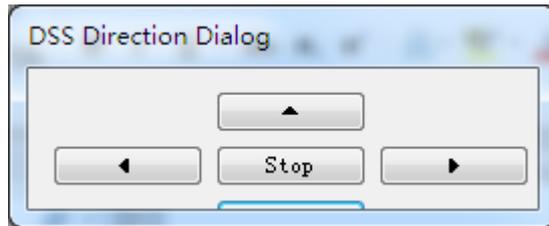
Next with “Import Manifest...” and choose LEGO.NXT.Tribot....



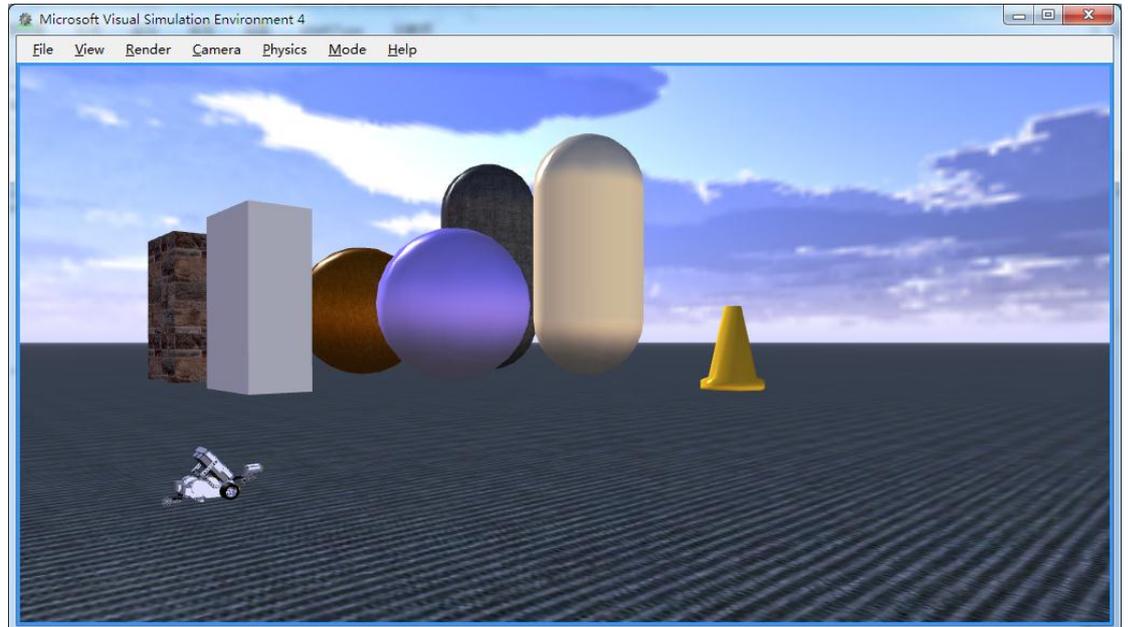
3. Running the program, and then you will see the following result. The simulating car can be controlled by the direction panel.



Direction panel is list as follows:



We press “right” button, the car run away from the original place.



Tips: if the program showing without DSS, then you can run the DSS in the start menu.

2) ASU VisualProgrammingEnvironment and LEGO EV3 Programming

1. In this part we use Visual Programming Environment (VPE) to write a program to control LEGO EV3 for MVPL cannot support LEGOEV3. Details for VPE can be seen in [2].
LEGO EV3 is figure out as right. You can use any other blocks to strength the ability of robotics.

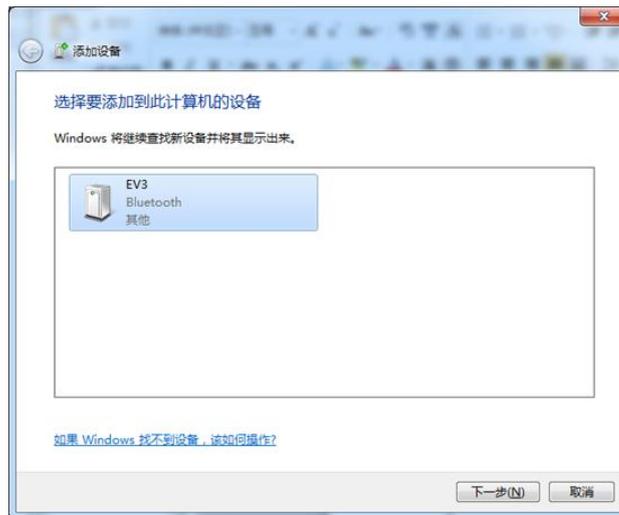


2. Connecting EV3 to PC
EV3 support the following ways to connect to PC: Bluetooth、WIFI、USB. We recommend Bluetooth as the first way to connect.

- (1) Power on EV3, and then open the Bluetooth port on EV3.
- (2) Searching Bluetooth devices from PC.



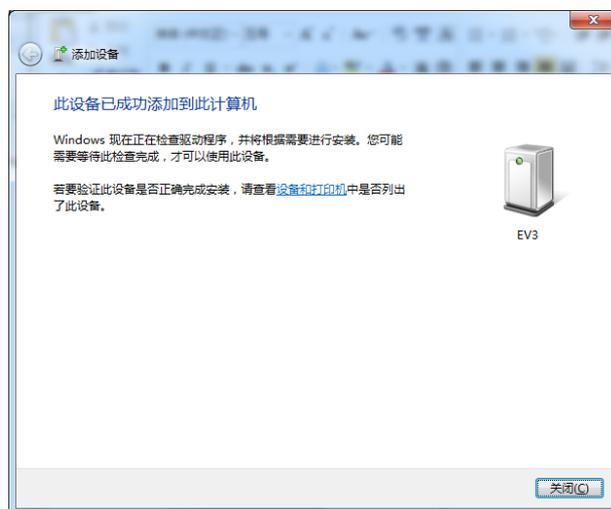
(3) When EV3 appeared, Click Next.

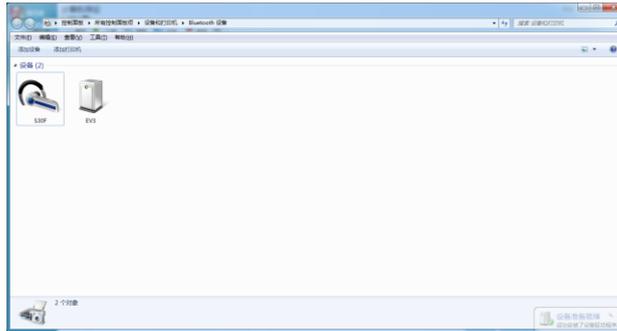


(4) And then the PIN code is needed, usually the PIN code is 1234, and also you can change the code in EV3.



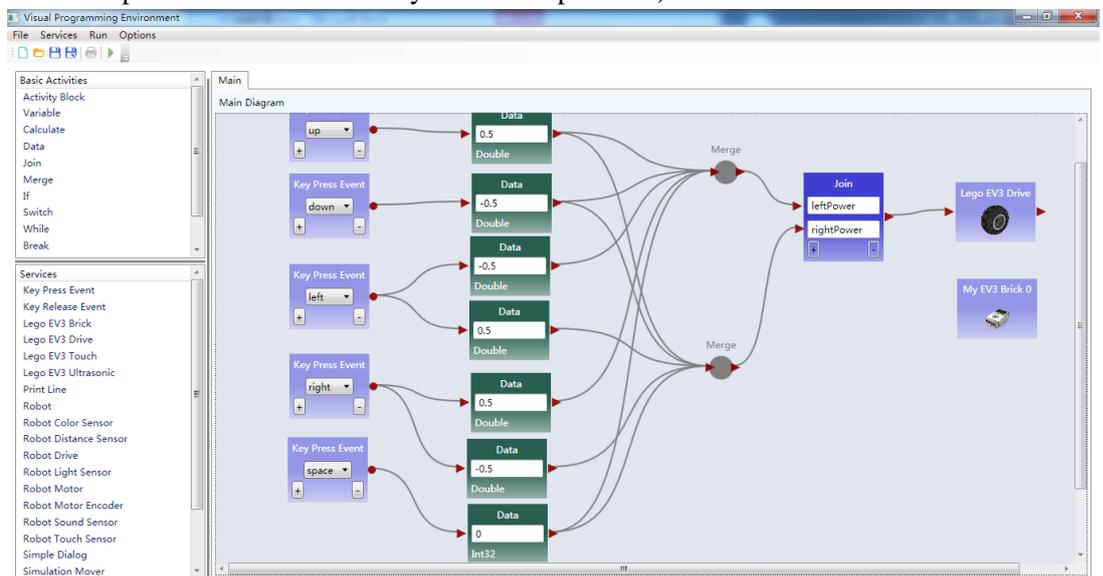
(5) You can check status of the link for EV3.





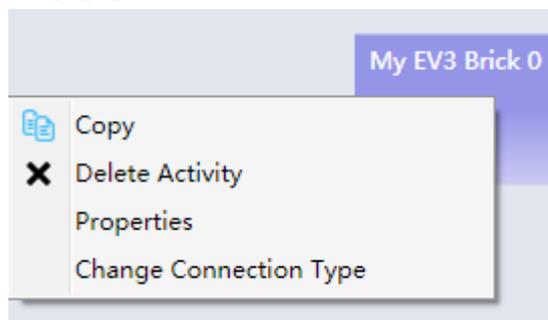
3. Programming in VisualProgrammingEnvironment to Control EV3

- (1) Running VisualProgrammingEnvironment.exe.
- (2) Programming with the help of the lower flowchart (tips: you will complete the flowchart with your own experience).

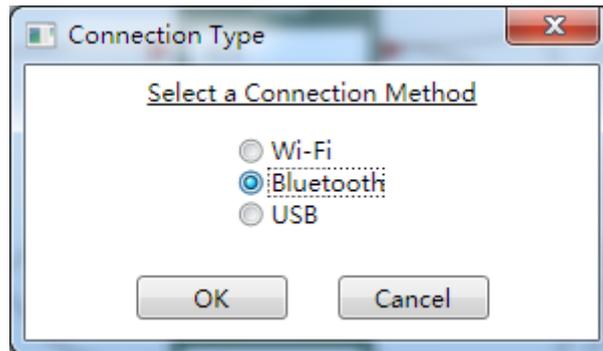


(3) Programming with EV3

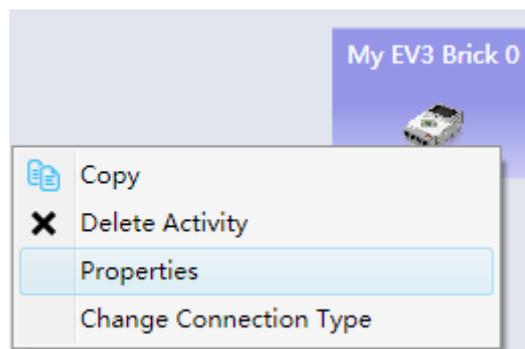
Right click “My EV3 Brick0” and choose “Change Connection Type” in the popup menu.



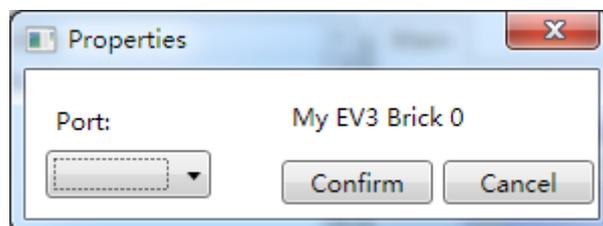
Choose “Bluetooth”



Then right click “My EV3 Brick 0” again to choose “Properties”



Here, we should choose one port to allow EV3 to communicate with PC, usually you can find out the proper port the Bluetooth properties. The following example chooses COM4, be careful you will change the port in your program.



(4) If there are not any other errors, you can control EV3 with PC keyboard.

【Assessments】

Hand out the lab report to the specify URL.

Hand out the (*.mvpl or *.xml) files at the same time.

Lesson4 PartI: Basic Concept of App Inventor

【OS & Software】

Windows XP/7, App Inventor

【Learning Outcomes】

Be familiar with MIT APP Inventor, programming with APP. Running your own APP in android phone.

【Instructions】

1) Introduce to MIT App Inventor

App Inventor is a B/S model software, you can use it once you got the right URL. In our lab we have our own URL. You can get the URL from your teacher.

1. To know the function of each element.
2. To understand the basic component of App Inventor.
3. Programming with APP Inventor, and downloading APK running in your android phone.

2) Make a calculator in MIT App Inventor

1. Complete the design of interface for calculator.
2. Be able to support arithmetic operation.

【Instructions】

1) Introduce to App Inventor

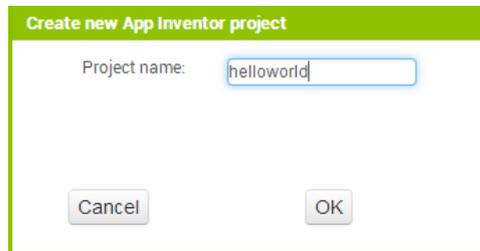
App Inventor is a B/S software, you can use any browser as follows to use it:

- Google Chrome 29+
- Safari 5+
- Firefox 23+

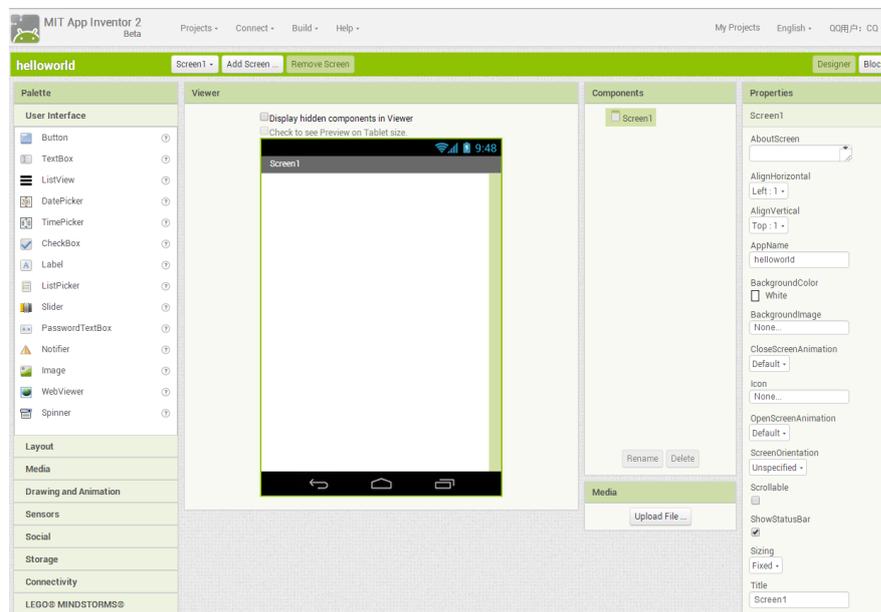
1. Open the specify URL which is published by your teacher (<http://ai2.appinventor.mit.edu/> or <http://app.gzjkw.net/?locale=en>) .



2. Start new Project, input the project name.



Enter in the main board.



The left side contains Palette, there are Button, Textbox and et al. “User interface” and other component like “Layout” are also exists in Palette. With the help of simple User interface control, we can build our first simple App—HelloWorld!

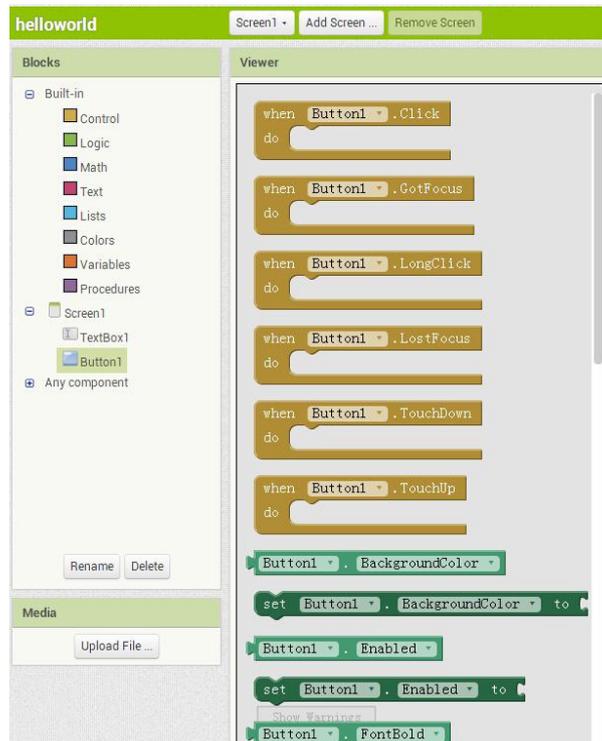
3. Drag control

In this program, we place one textbox and one button, when button is pressed, “hello world!” is displayed in the textbox.

4. Coding

Press the button “Blocks” which lay out on the right-top of the interface, and then click “Button1” in the left panel “Blocks”.





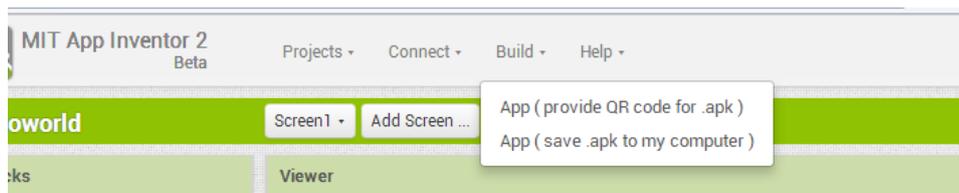
After completed the program, the code should be like this.

```

when Button1 . Click
do
  set TextBox1 . Text to "hello world!"
  
```

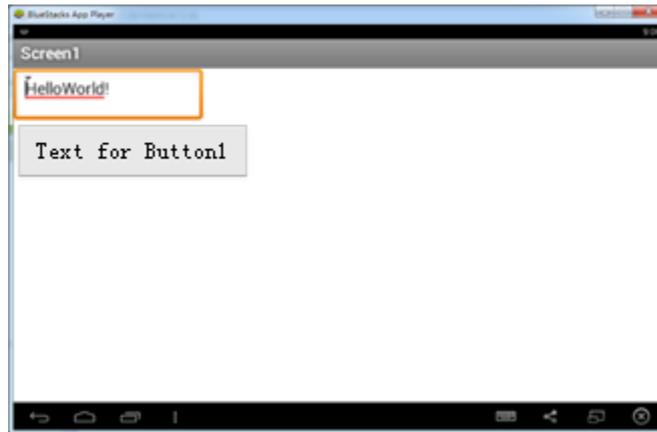
5. Build App

Press the menu “Build”-“App(save.apk to my computer)” to download the APK files.



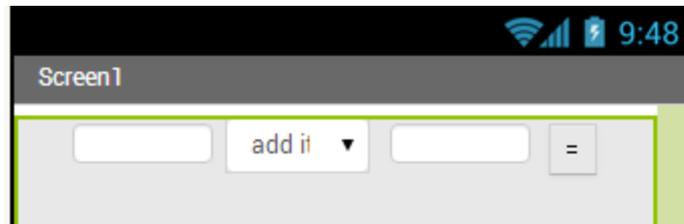
6. Run in android simulator or android phone

The following figure shows the operating results in BlueStacks simulator.



2) A simple calculator under App Inventor

1. Appearance of the calculator



2. Codes

You can follow the following flowchart to complete the task (be careful, the flowchart does not contain all the requirements of the task, you should tackle with some conditions like the error occurs when dividing a number by zero)

```
initialize global resres to 0
when Button1.Click
do
  if ListPicker1.Selection = "+"
  then
    set global resres to Textbox1.Text + Textbox2.Text
    call Simpledialog.ShowDialog
    notice get global resres
  else if ListPicker1.Selection = "-"
  then
    set global resres to Textbox1.Text - Textbox2.Text
    call Simpledialog.ShowDialog
    notice get global resres
  else if ListPicker1.Selection = "*"
  then
    set global resres to Textbox1.Text * Textbox2.Text
    call Simpledialog.ShowDialog
    notice get global resres
  else if ListPicker1.Selection = "/"
  then
    set global resres to Textbox1.Text / Textbox2.Text
    call Simpledialog.ShowDialog
    notice get global resres
```

【Assessments】

1. No lab report is needed in this task.
2. But the project file (*.aia) should be hand out to the specified place.

Lesson5 PartII:Building a Simple App (MoleMash)

【OS & Software】

Windows XP/7, App Inventor

【Learning Outcomes】

Be familiar with MIT APP Inventor, understand the random number and clock sensors and human interface of touch screen.

【Instructions】

1) To understand the clock sensor.

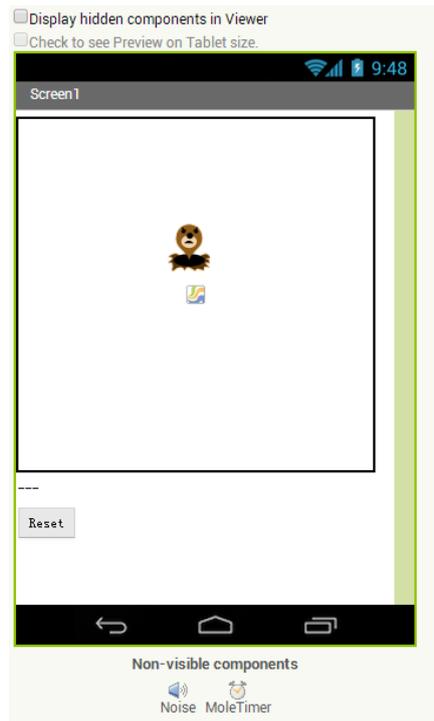
1. Be able to use clock sensor.
2. Be able to define a function to use the clock sensor.

2) Write a game named with MoleMash.

1. User can operate on the touch screen. When MoleMash have been pressed, the total score should be can automatically added.
2. The program can clear the score.

【Instructions】

Appearance of the MoleMash game program (Be careful with the uploading way for the image of MoleMash).



Codes are list in the figure.

```

to MoveMole
do
  set Mole.X to random fraction × MyCanvas.Width - Mole.Width
  set Mole.Y to random fraction × MyCanvas.Height - Mole.Height

initialize global score to 0

when MoleTouched
  do
    set global score to get global score + 1
    call Noise.Vibrate 100
    call UpdateScore
    call MoveMole

when ResetButton.Click
  do
    set global score to 0
    call UpdateScore

to UpdateScore
  do
    set ScoreLabel.Text to join " Score: " get global score

when MoleTimer.Timer
  do
    call MoveMole
  
```

【Assessments】

Hand out the lab report to the specify URL.
Hand out the (*.aia) files at the same time.

Lesson6 Web pages Design

【OS & Software】

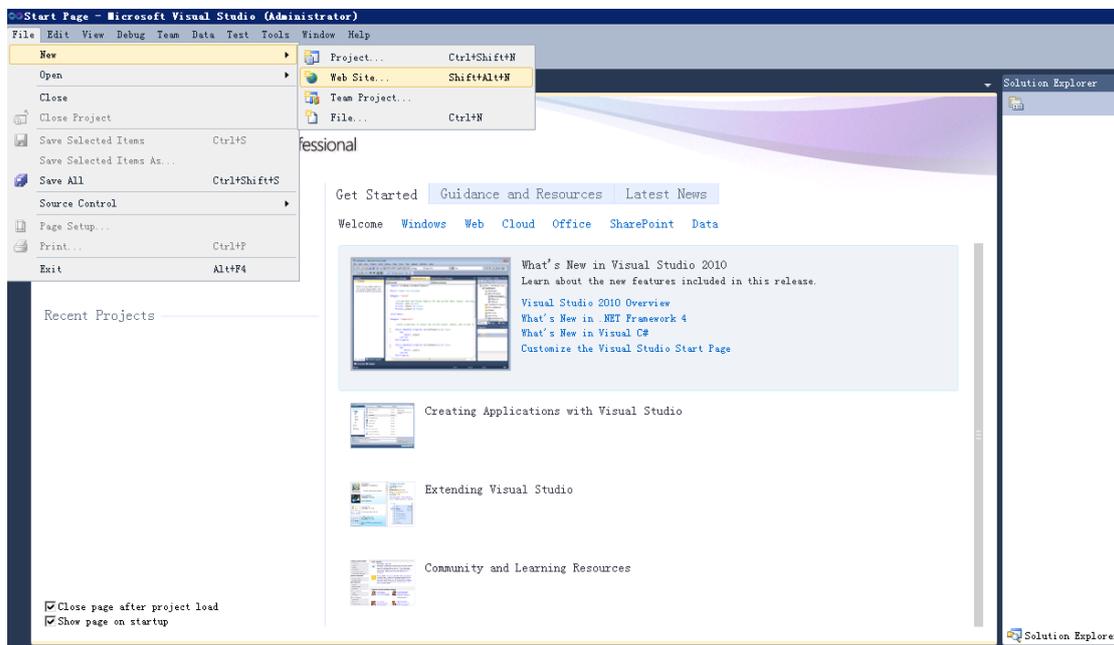
Windows XP/7、VS2005/08/10、SQLServer2008 or Access

【Learning Outcomes】

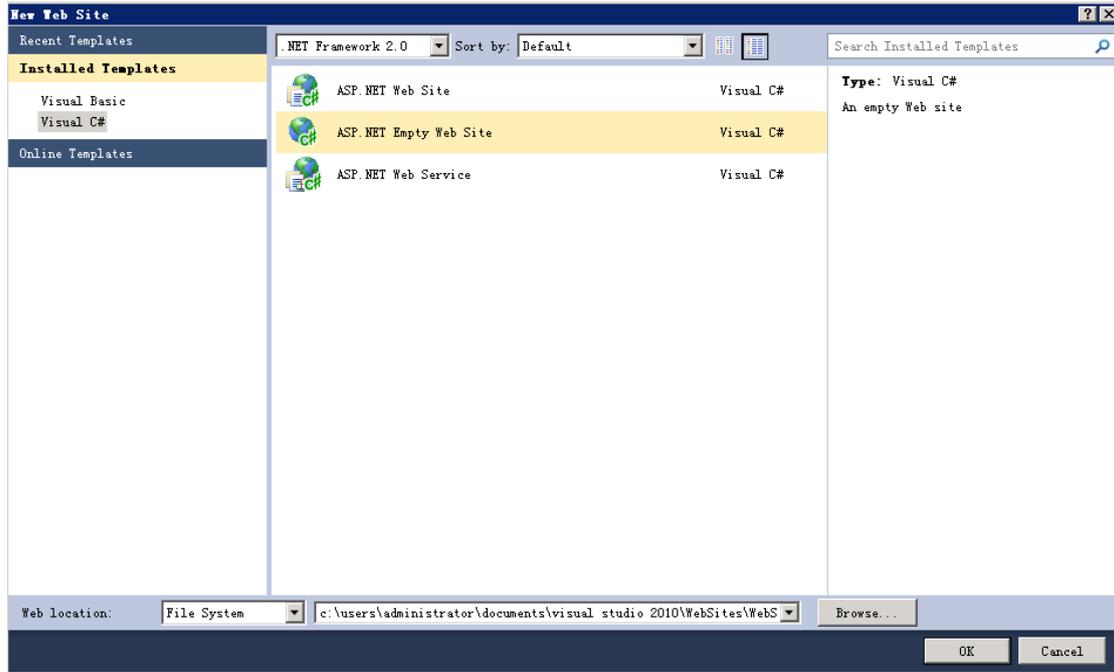
You should understand the basic principal of the website, and also writing a program to show the information which stored in database online.

【Instructions】

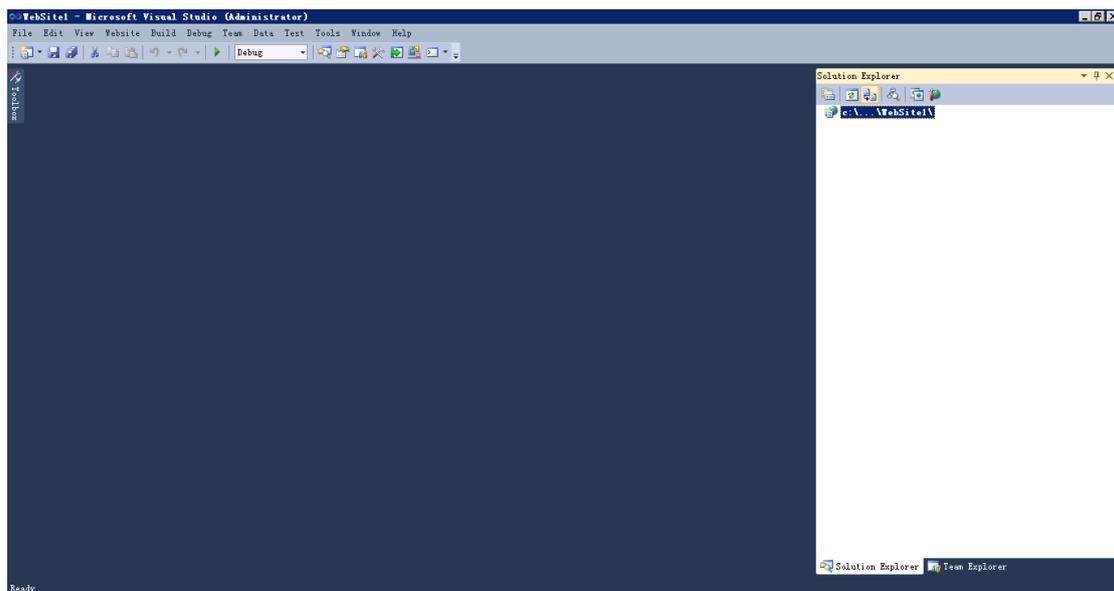
1. Running VS2005/2008/2010,select “Website”(vs2010 is used in this lab manual)



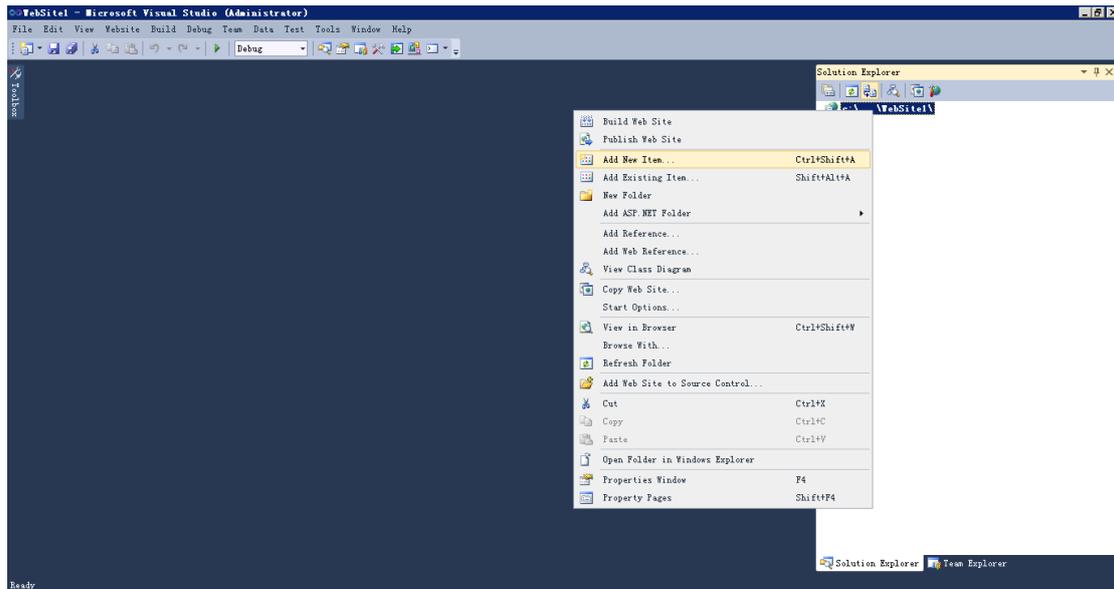
2. Choose “Asp.net Empty Web Site” in the popup menu, and then click “OK”. Be careful, we choose “.Net Framework 2.0” in the dropdown list control, and we may choose “Visual C#” in the left panel “Installed Templates”.



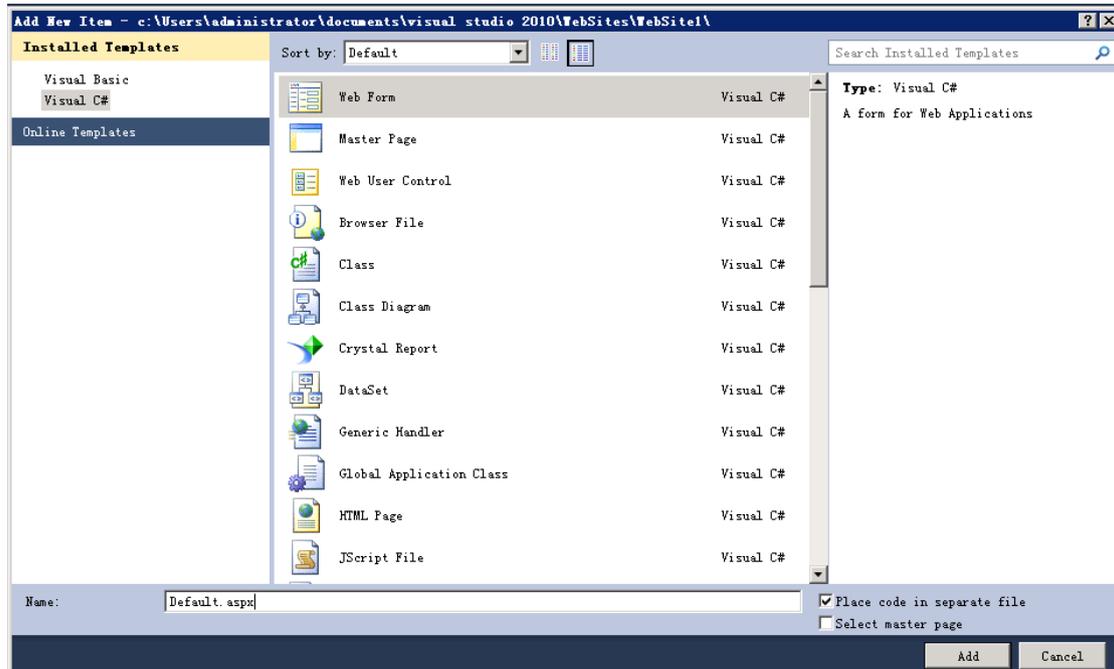
3. The following picture shows the vs2010 programming environment.



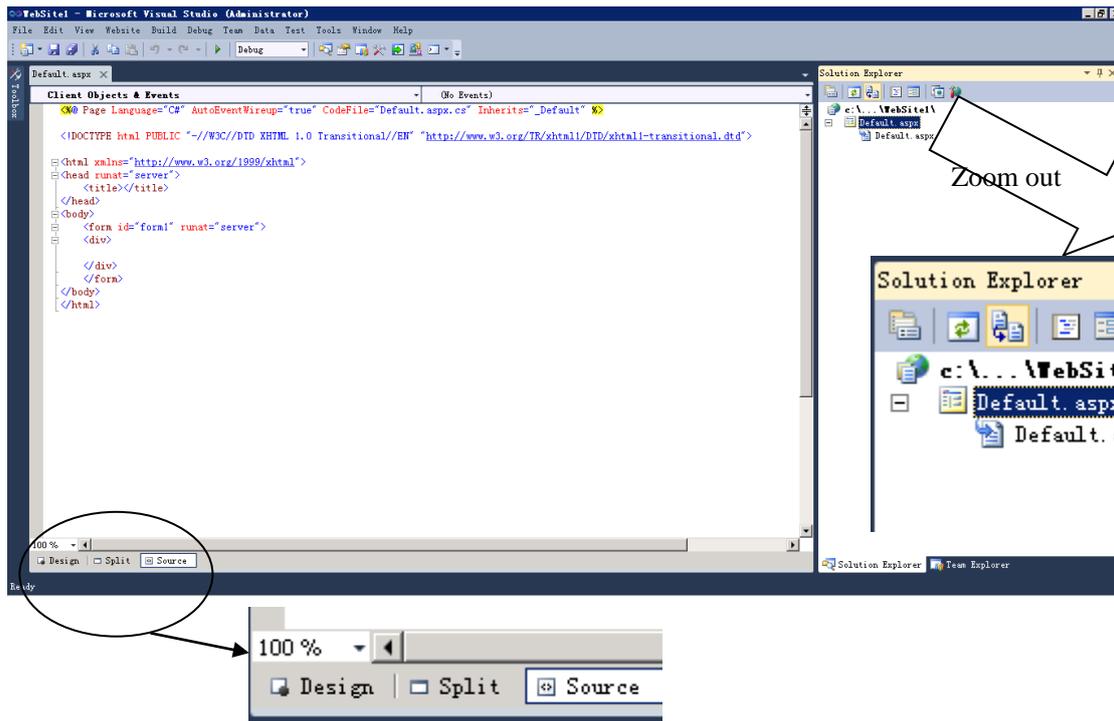
Solution Explorer lies on the right side. We can add new webpages by right click and then choose “Add New Item” from “C:\...\WebSite1” as follows.



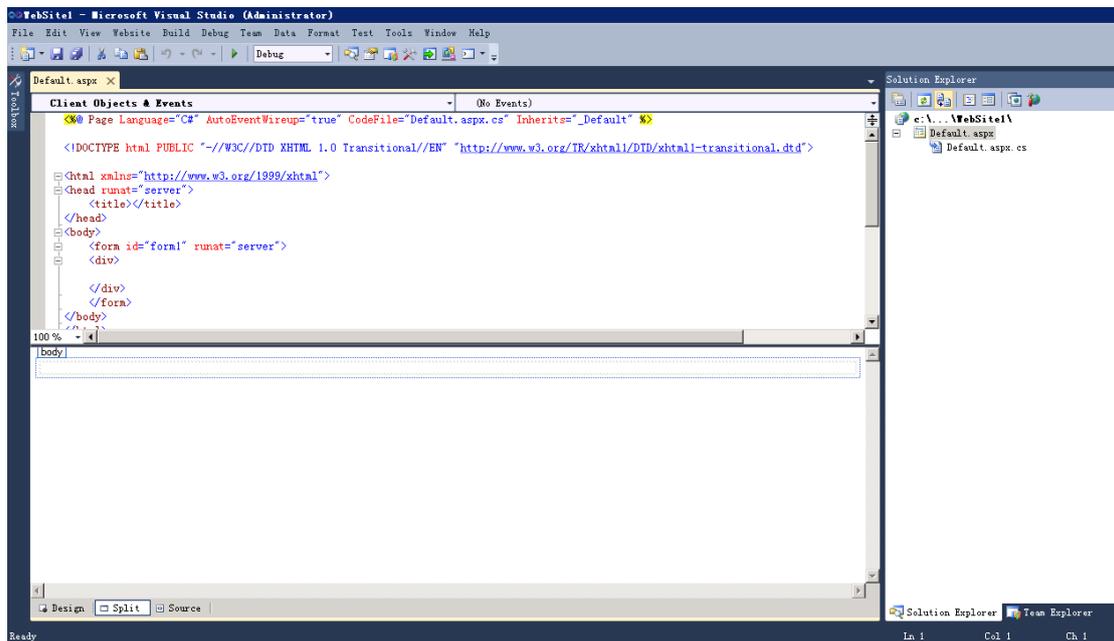
And then choose “Web Form”, type in the name of the new file, then click “Add”.



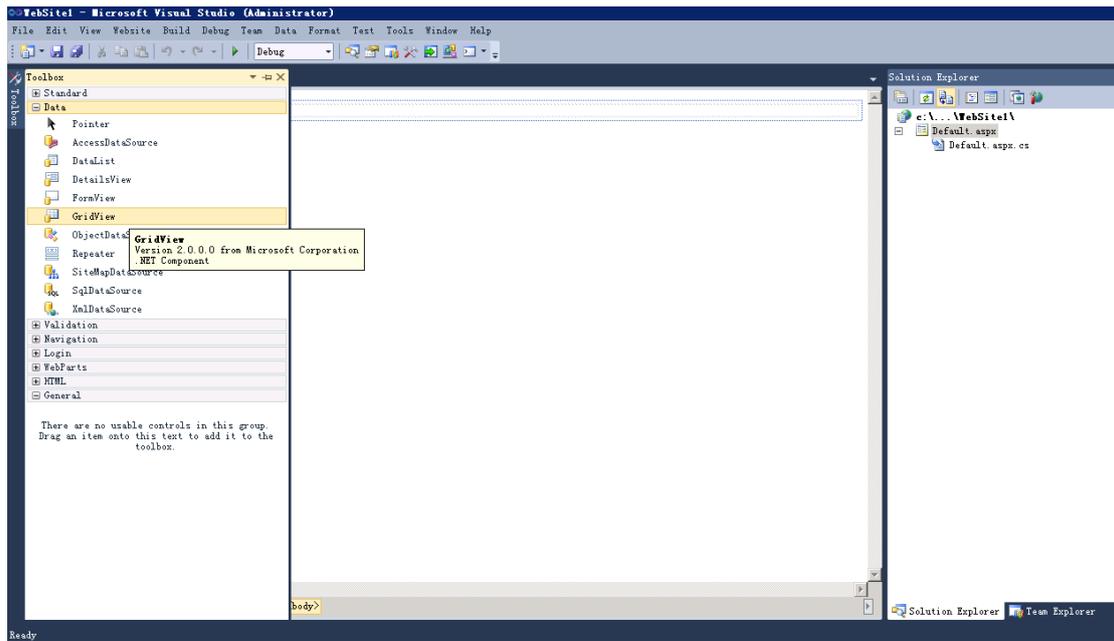
4. Double click “Default.aspx”, then the code of “Default.aspx” shows in the main area.



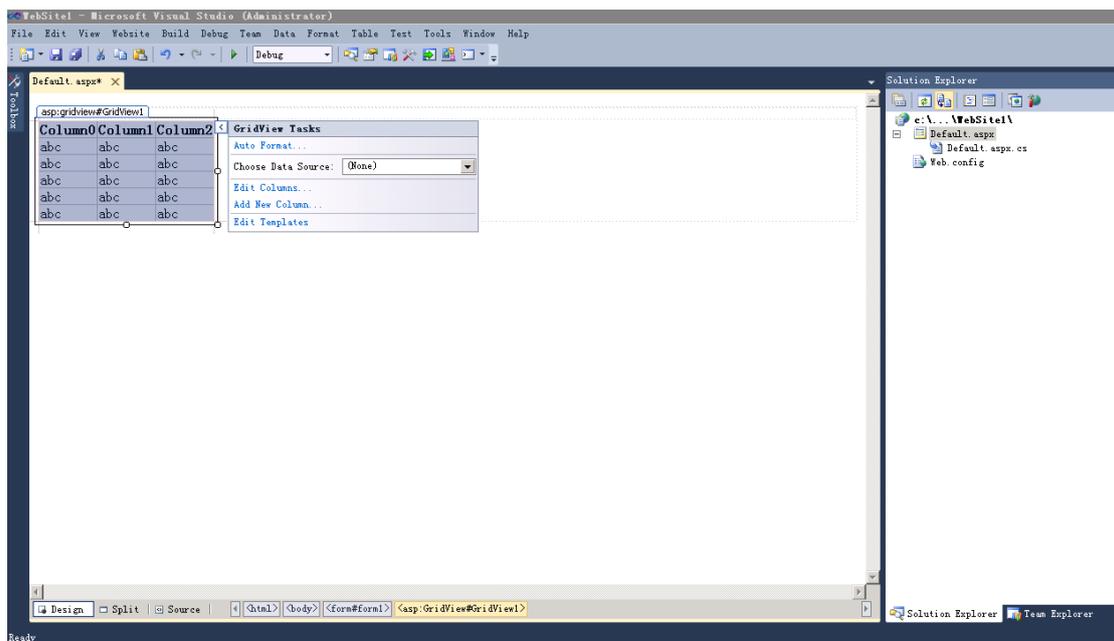
5. VS2010 give three views of the files, they are “Design”, ”Split” and “Source”. The following figure shows the “Split” view.



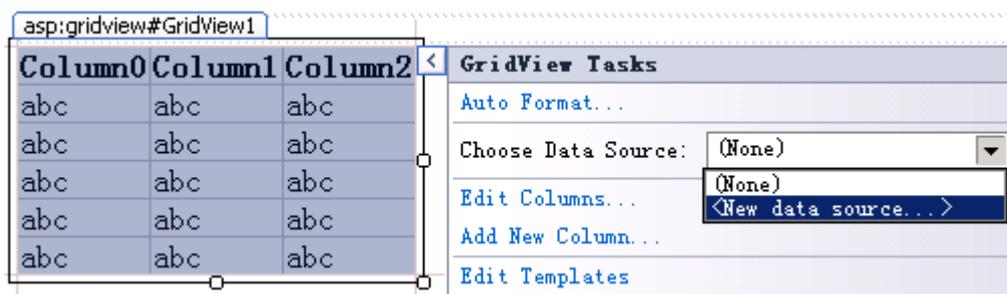
6. In “Design” view, we can find the toolbox in the left-upper corner, click “Toolbox” then choose “Data”->“Gridview”.



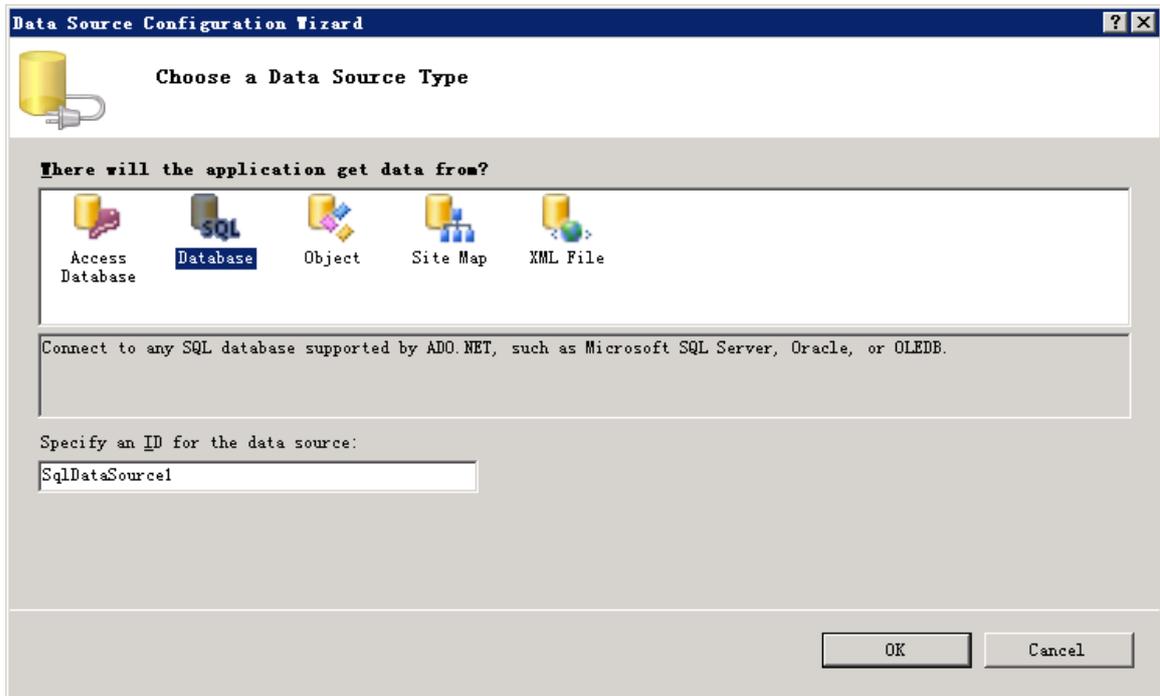
7. Drag “GridView” to the main area, and it shows as follows.



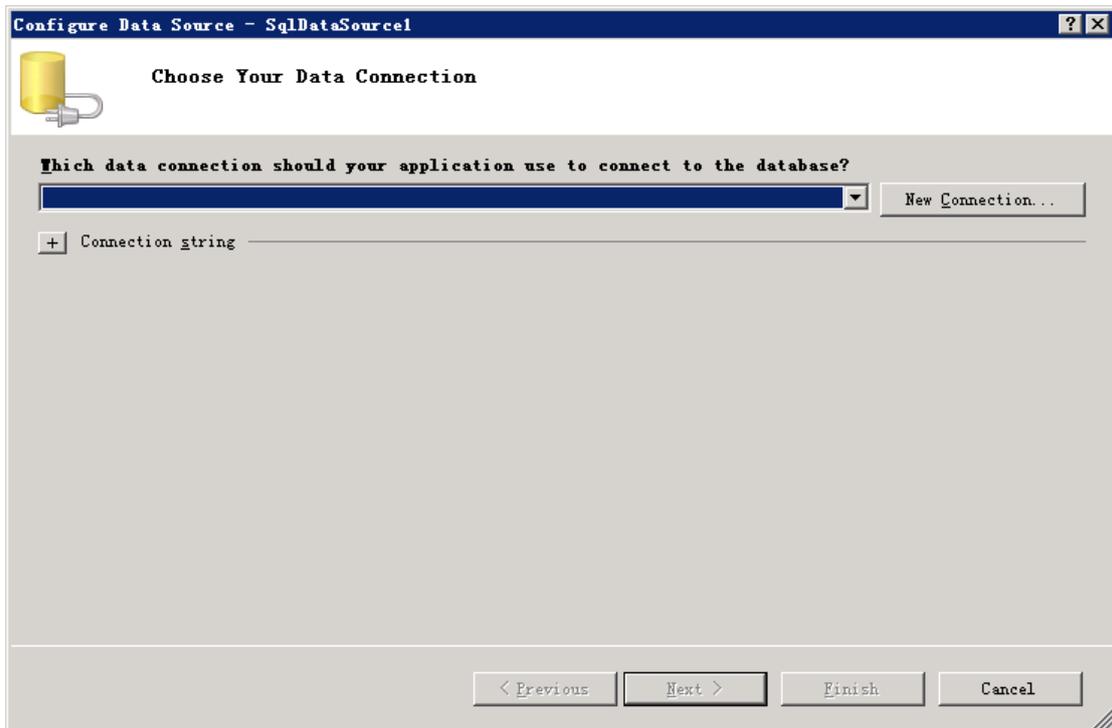
8. Click the “triangle” icon of GridView, then you can configure the tasks of it. And choose “<New data source...>” in the dropdown list.



9. Select “Database” in the dialog, and then click “OK”.



10. Choose “New Connection..”.



11. Configure “Add Connection”.

Add Connection [?] [X]

Enter information to connect to the selected data source or click "Change" to choose a different data source and/or provider.

Data source: Microsoft SQL Server (SqlClient) [Change]

Server name: [.] [Refresh]

Log on to the server

Use Windows Authentication

Use SQL Server Authentication

User name: []

Password: []

Save my password

Connect to a database

Select or enter a database name: [test]

Attach a database file: [] [Browse...]

Logical name: []

[Advanced...]

[Test Connection] [OK] [Cancel]

Server name "." means the local

"Use Windows Authentication" means we will not supply the password.

Select the database in our program

12. Return to "Configure Data Source". Then click "Next".

Configure Data Source - SqlDataSource [?] [X]

Choose Your Data Connection

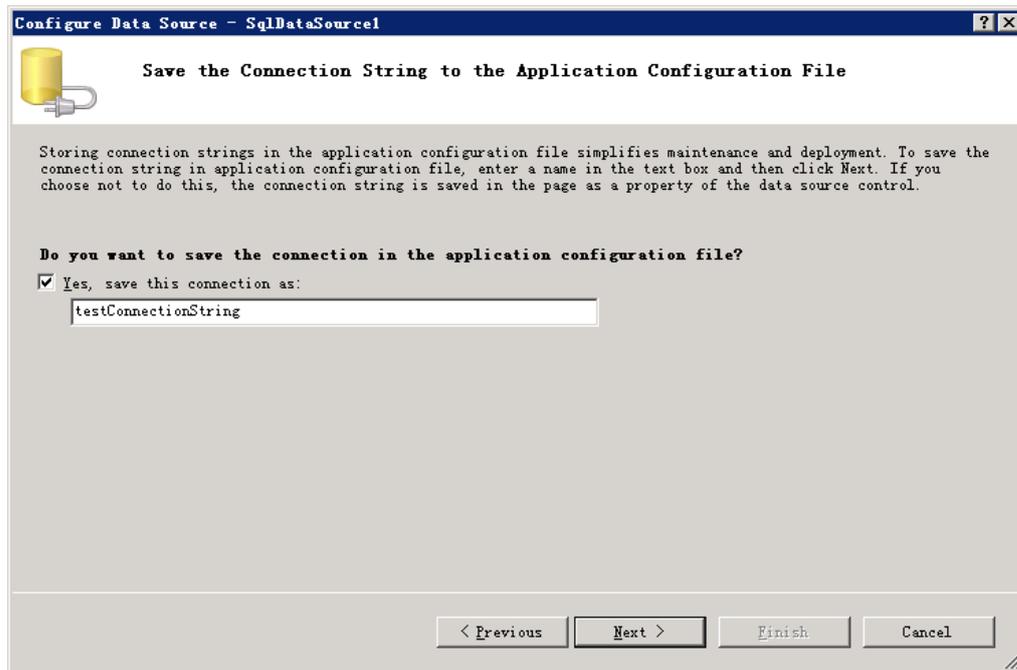
Which data connection should your application use to connect to the database?

[win-arfooludnd4.test.dbo] [New Connection...]

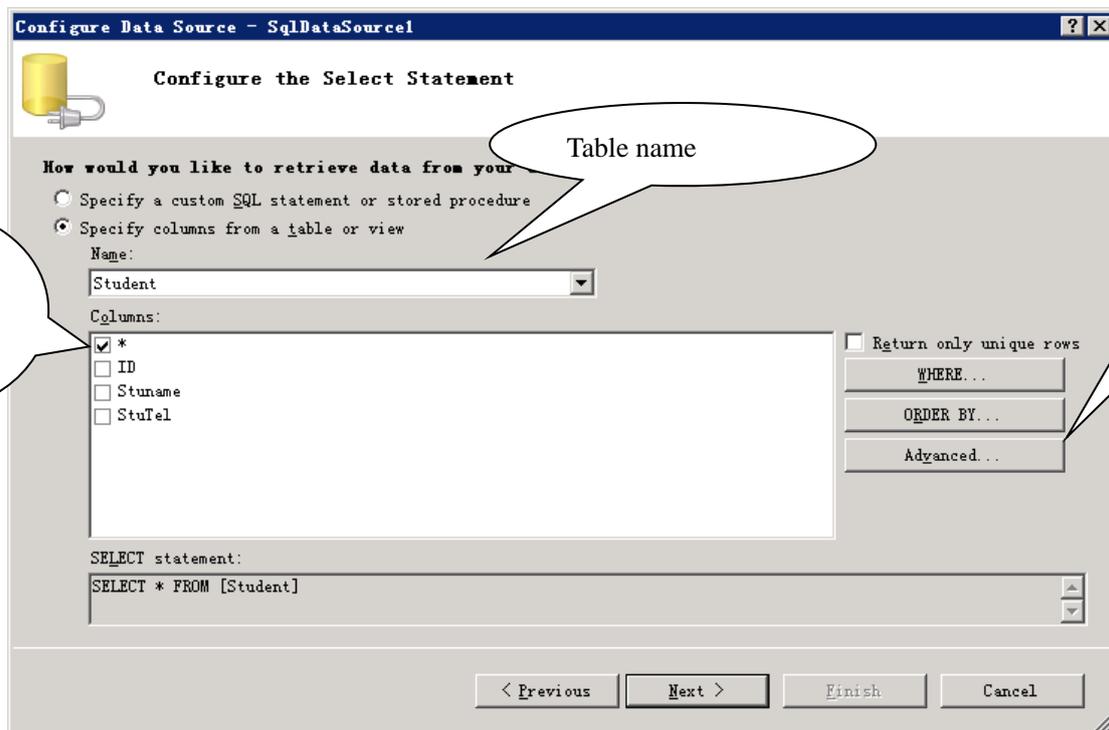
+ Connection string []

[< Previous] [Next >] [Finish] [Cancel]

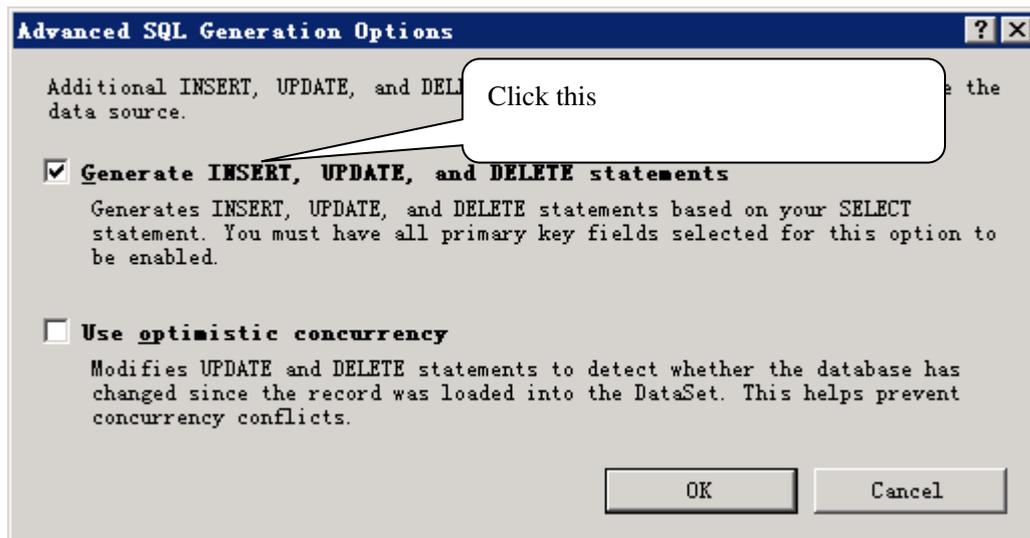
13. Save the connection string, then we can use it any time and without the upper configuration process.



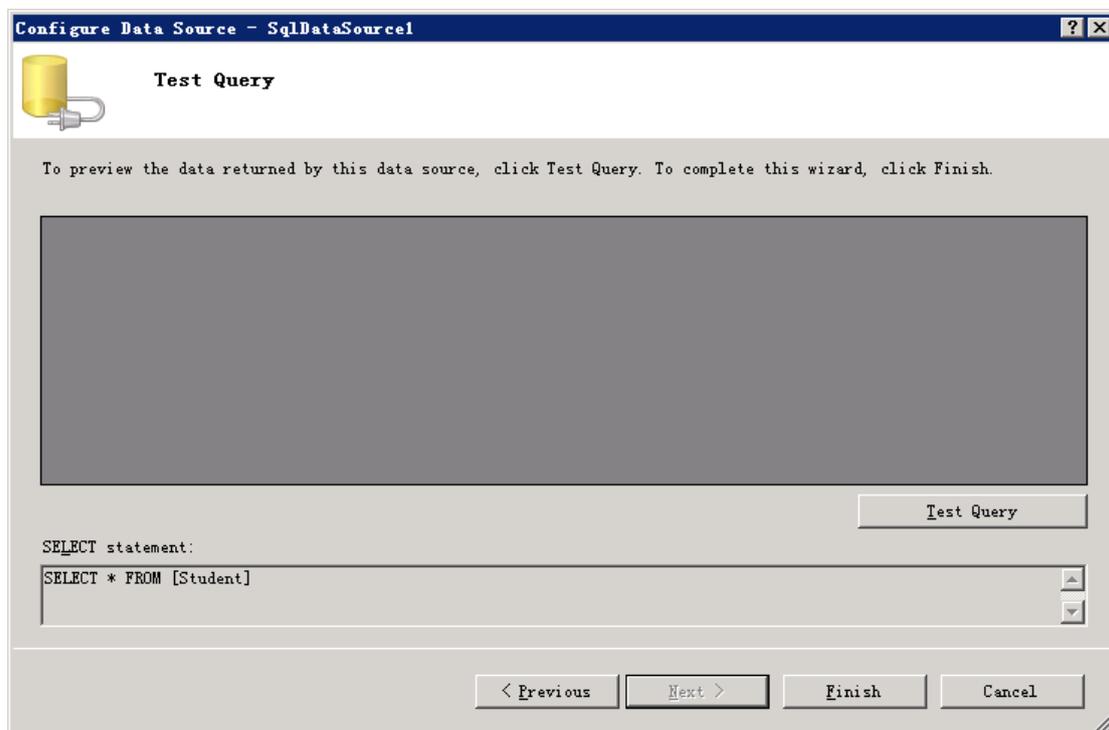
14. Choose table which you want to show on the web.



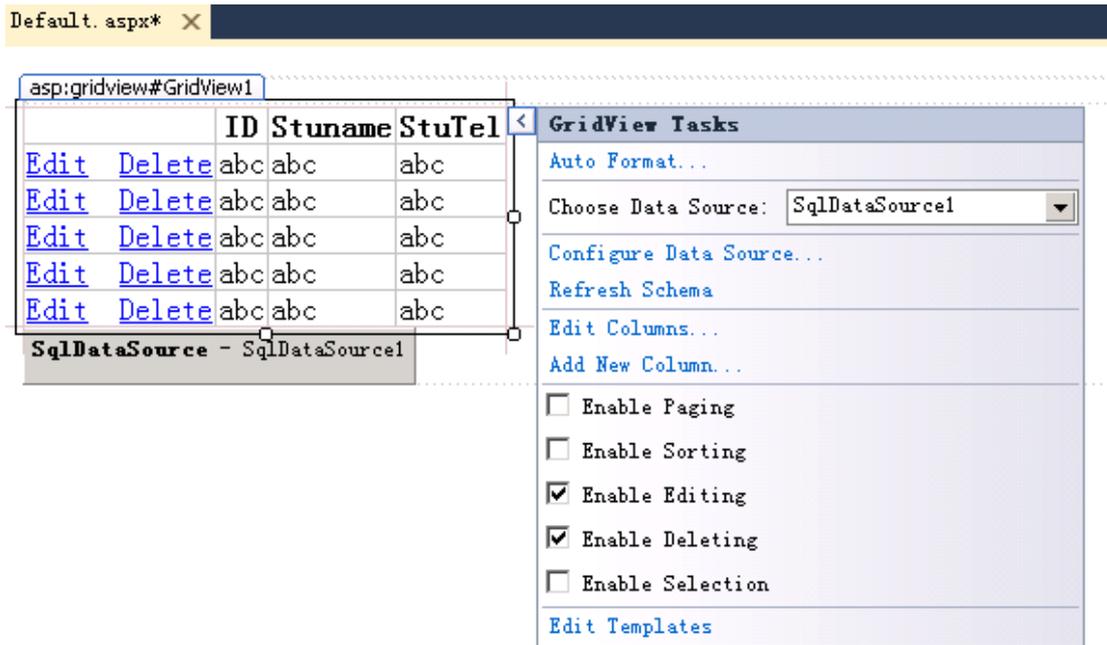
15. If you want to edit the data through webpage, you should click "Advanced" in the upper figure. And then click "Generate Insert, Update and Delete statements"



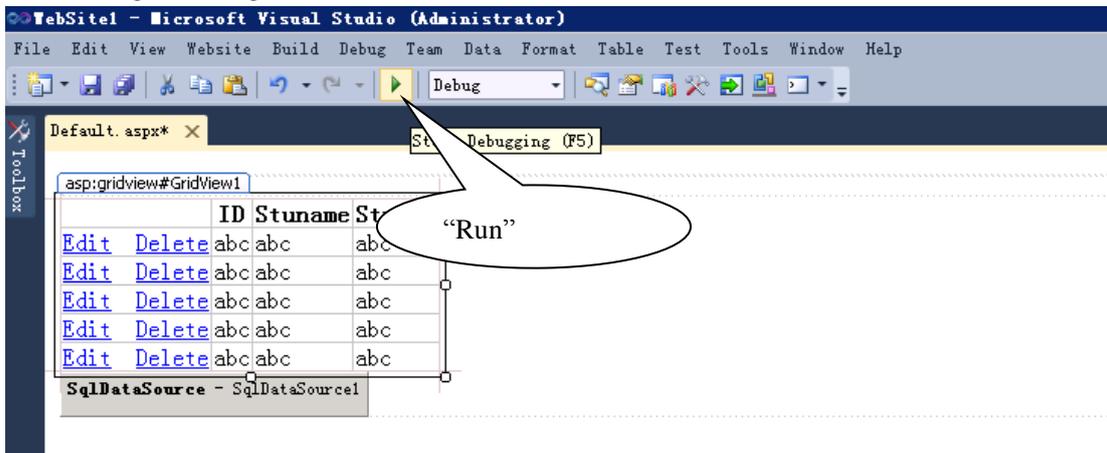
16. Then click “OK”, and now, the process of database have been tackled successfully. Then click “Finish”.



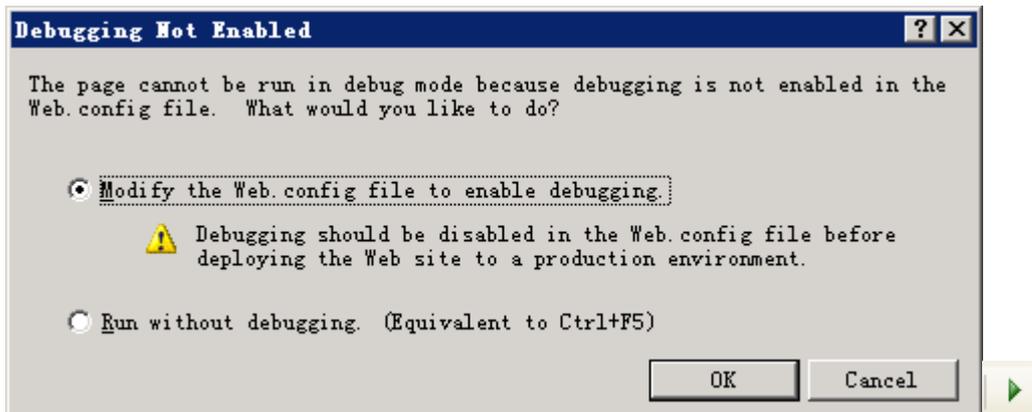
17. We come back to VS2010 main area. Click the “triangle” icon of the GridView again. Then choose “Enable Editing” and “Enable Deleting”.



18. When finished all the configure setting, you can click “run” on the toolbar  to see whether it goes all right.



At the first time when you run this page, here we will see a dialog to decide whether to use debug. Here we choose the first option “Modify the Web.config file to enable debuggin”.



21. Results.

	ID	Stuname	StuTel
edit delete	1	Jack	023834842
edit delete	2	Frank	2344322
edit delete	3	Bush	66666666

【Cautions】

1. You must install VS2005/2008/2010 at first, then you can use any kind of database, such as Access, SQL Server et al.
2. Write your correct ID and student name.

【Assessments】

1. Hand out the lab report to the specify URL.
2. Hand out the project files at the same time.

Lesson7 Course Design

【OS & Software】

Windows XP/7 and other software decided by yourself

【Learning Outcomes】

To choose one of the tasks, then complete the course design.

【Instructions】

1) Tasks

- 1.Word Advanced
- 2.Excel Advanced
- 3.Web Design
- 4.Flash
- 5.Photoshop
- 6.Ulead Video Studio
- 7.App Inventor
- 8.LEGO EV3 Programming

2) Cautions

1. You should complete this task by yourself.
2. Finish it on time.
3. Write the correct ID and student name.

【Assessments】

1. Hand out the lab report to the specify URL.
2. Hand out the files in your task to the same place.

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