『物聯網概論』實驗手冊

實驗模組名稱: RFID Tag 及 Reader 元件模組等識別技術介紹與程式化控制

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實驗平台: Speedway Reader IPJ-R1000

實驗主軸: RFID 點名系統

實驗內容關鍵字: RFID

本實驗手冊乃『教育部網路通訊人才培育先導型計畫-課程發展計畫』支持所發展之實驗手冊

實驗目的

介紹物聯網識別技術，並實作物聯網重要之識別技術：射頻識別系統，使物件可透過識別模組(如 RFID 之射頻識別系統)被自動且即時的識別。本實驗將介紹 RFID 系統架構其各硬體模組，並教導學生在個人電腦中實作一 RFID 點名系統，使學生除了熟悉 RFID 射頻辨識理論外，並熟悉 RFID 實作技巧其程式開發相關經驗。

實驗器材

- Speedway Reader IPJ-R1000
  - RJ-45 乙太網路埠 (標示為 10/100 BASE-T)
  - 四個 Female RP-TNC 無線射頻天線連接埠 (標示為 ANT1~ANT4)
  - 序列通訊所連接之 Female DB-9 連接埠 (標示為 SERIAL)
  - Female DB-25 連接埠具備 GPIO 功能

實驗所需軟體

- PC
  - Windows OS
  - Visual Studio 2010
  - MySql Connecter
  - MySql DataBase

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- RFID 簡介及 RFID 設備介紹

A. RFID 簡介

無線射頻辨識即 RFID（Radio Frequency IDentification,RFID）技術，又稱電子標籤，是一種通訊技術，可通過無線電訊號識別特定目標並讀寫相關數據，而無需識別系統與特定目標之間建立機械或光學接觸。

RFID 標籤分為被動，半被動（也稱作半主動），主動三類。

被動式標籤沒有內部供電電源。其內部積體電路通過接收到的電磁波進行驅動，這些電磁波是由 RFID 讀取器發出的。當標籤接收到足夠強度的訊號時，可以向讀取器發出數據。

由於被動式標籤具有價格低廉，體積小巧，無需電源的優點。目前市場的 RFID 標籤主要是被動式的。

一般而言，被動式標籤的天線有兩個任務：

1. 接收讀取器所發出的電磁波，藉以驅動標籤 IC
2. 標籤回傳信號時，需要靠天線的阻抗作切換，才能產生 0 與 1 的變化。

半主動式類似於被動式，不過它多了一個小型電池，電力恰好可以驅動標籤 IC，使得 IC 處於工作的狀態。這樣的好處在於，天線可以不用管接收電磁波的任務，充分作為回傳信號之用。比起被動式，半主動式有更快的反應速度，更好的效率。

主動式與被動式和半被動式不同的是，主動式標籤本身具有內部電源供應器，用以供應內部 IC 所需電源以產生對外的訊號。一般來說，主動式標籤擁有較長的讀取距離和較大的記憶體容量可以用來儲存讀取器所傳送來的一些附加訊息。

TAG 是目前 RFID 技術的關鍵。TAG 可存儲一定容量的資訊並具一定的資訊處理功能，讀寫設備可通過無線電訊號以一定的數據傳輸率與標籤交換資訊，作用距離可根據採用的技術有不同的距離。

TAG 的外形尺寸主要由天線決定，而天線又取決於工作頻率和對作用距離的要求。目前有四種頻率的標籤在使用中比較常見。他們是按照他們的無線電頻率劃分：低頻標籤（125 或 134.2 kHz），高頻標籤（13.56 MHz），超高頻標籤（868~956 MHz）以及微波標籤（2.45 GHz）。

B. RFID 設備介紹

◆ 工作頻率範圍

Speedway Reader 提供了共計 12 個頻率波道，以跳頻的方式，工作於符合國家通訊傳播委員會規範之超高頻無線辨識系統（ 922 ~ 928 MHz ，頻率範圍於 922.25 ~ 927.75 MHz ，波道間隔為 500 KHz ），如表格 1-1 所示：

表格 1-1 工作頻率範圍表

發射波道	中心頻率 (MHz)
1	922.25
2	922.75
3	923.25
4	923.75
5	924.25
6	924.75
7	925.25
8	925.75
9	926.25
10	926.75
11	927.25
12	927.75

◆ 啟用 Speedway Reader

此讀取器將需要配置電壓 24 伏特之電源供應器 (CUI ， Inc. ， P/N DTS249259UC-P11P-DB) ，擅自使用不同之電源供應器將有可能導致設備損壞

◆ 系統及設備需求

詳細適用設備環境記載於表格 2-1

表格 2-1 適用設備環境表

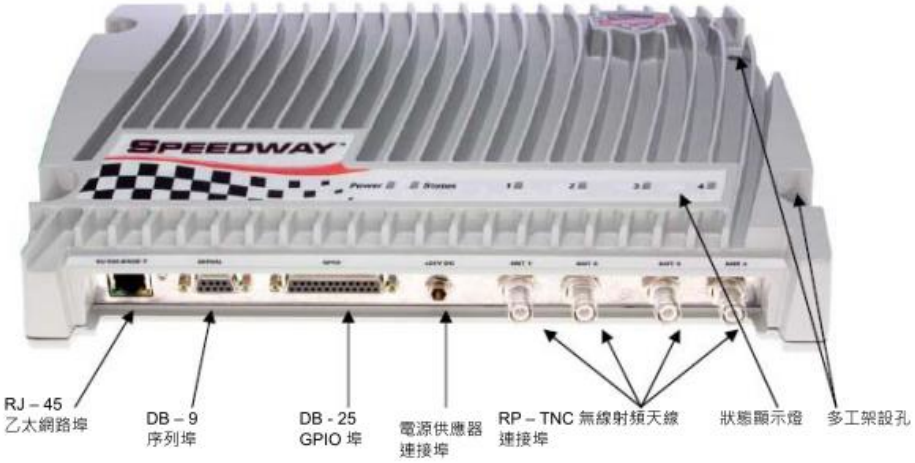
介面	通訊協定	基本需求		
		Windows	Linus	Mac/Other
網路介面	HTTP	可相容於常用性瀏覽器：IE(6+)、Firefox(1.5+) 以及 Netscape(5.5+)		
遠端登入	SSH/Telnet	Putty	SSH or Telnet	Terminal
序列埠	RS-232	Hyperterminal	Minicom	N/A

下列所記載之相關配備為基本使用之需求，使用者應確認所具備之設備是否符合所記載之需求

- 作業系統： Windows 2000/XP 、 Linux PC 同時具備：
- RS-232 序列埠 (如系統未支援 DHCP 功能)
- 網路埠
- 支援 Jave Runtime Enviruoment(JRE) 版本 1.4.2 以上之網際網路瀏覽器(可於 http://www.java.com/en/download/manual.jsp 下載)
- TCP/IP 網路連結配備
- 乙太網路埠
- 標準乙太網路線
- Impinj 認定之超高頻無線辨識系統天線及相關連接訊號電纜線 (配附
- RP-TNC Male Connector)
- 標準 DB9 序列線 (僅於系統未支援 IP 連結功能時需要)

◆ Speedway Reader 輸入 / 出埠系統

- RJ-45 乙太網路埠 (標示為 10/100 BASE-T)
- 四個 Female RP-TNC 無線射頻天線連接埠 (標示為 ANT1~ANT4)
- 序列通訊所連接之 Female DB-9 連接埠 (標示為 SERIAL)
- Female DB-25 連接埠具備 GPIO 功能，內含：
- RS-232 序列介面
- 四個 3.3/5 伏特類比訊號輸入
- 八個 3.3 伏特類比訊號輸出
- 請參照：
- 表格 2-2 所顯示之類比訊號輸出表
- 表格 2-3 所顯示之 GPIO 訊號規範
- 圖示 2-2 所顯示之 DB-25 Female 連結埠



圖示 2-1 Impinj Speedway Reader 連接埠狀況圖

表格 2-2 DB-25 連接埠配線表

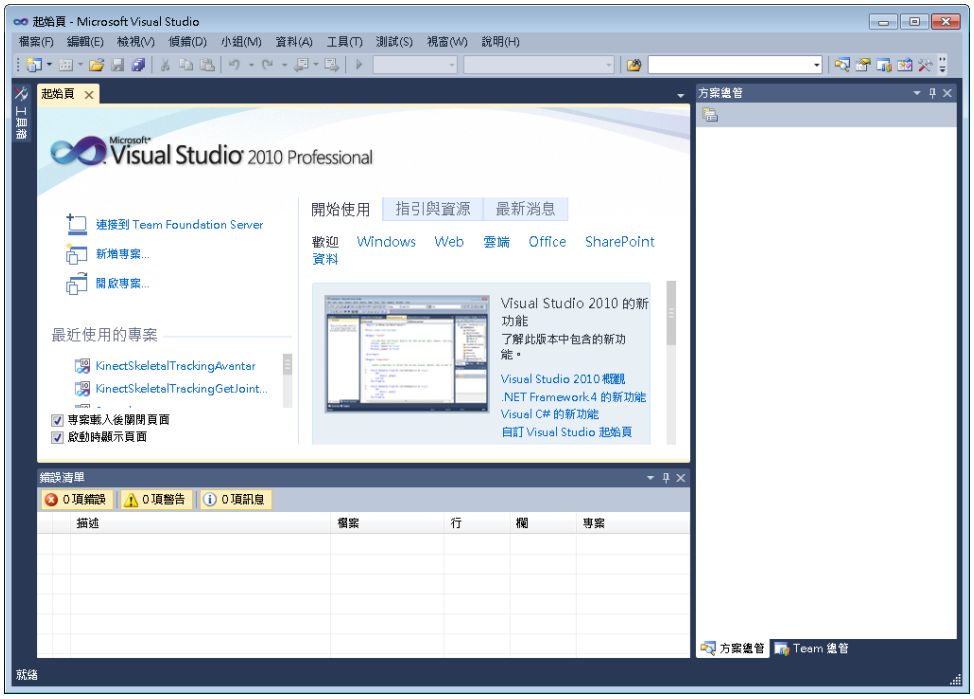
Pin	輸入/出類比訊號	Pin	輸入/出類比訊號	Pin	輸入/出類比訊號
1	未連接	10	GPIN3	19	GPOUT5
2	RS-232 RXD	11	GPIN2	20	未連接
3	RS-232 TXD	12	GPIN1	21	GPOUT6
4	RS-232 CTS	13	GPIN0	22	未連接
5	RS-232 RTS	14	GPOUT0	23	GPOUT7
6	未連接	15	GPOUT1	24	未連接
7	訊號接地	16	GPOUT2	25	未連接
8	未連接	17	GPOUT3		
9	未連接	18	GPOUT4		

- 實驗環境建置

A. 介紹實驗所需之軟體

Visual Studio

http://www.microsoft.com/taiwan/vstudio/2010/download/default.aspx



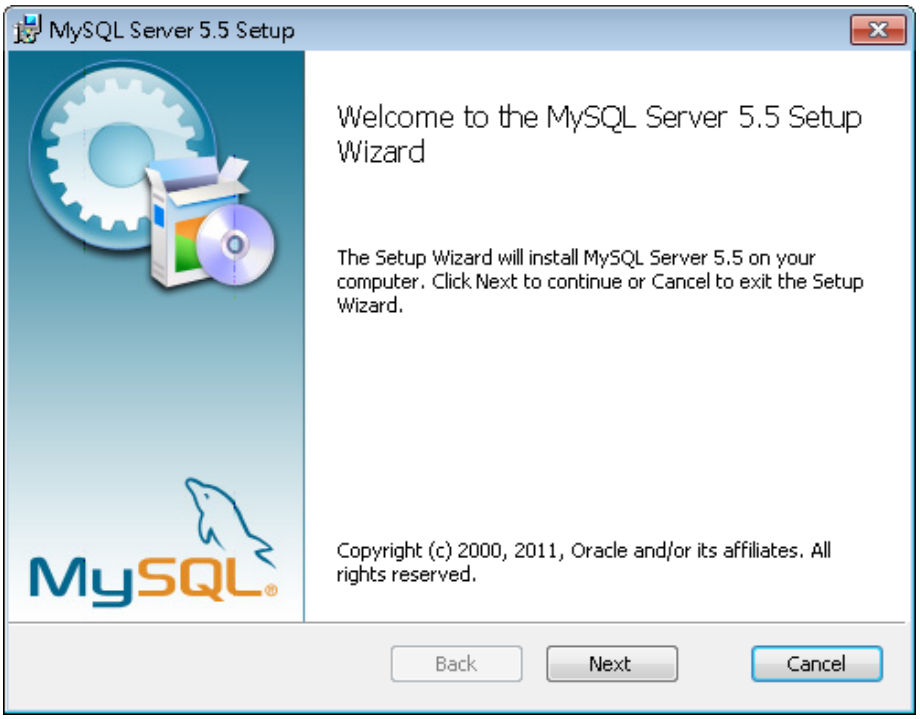
MySql

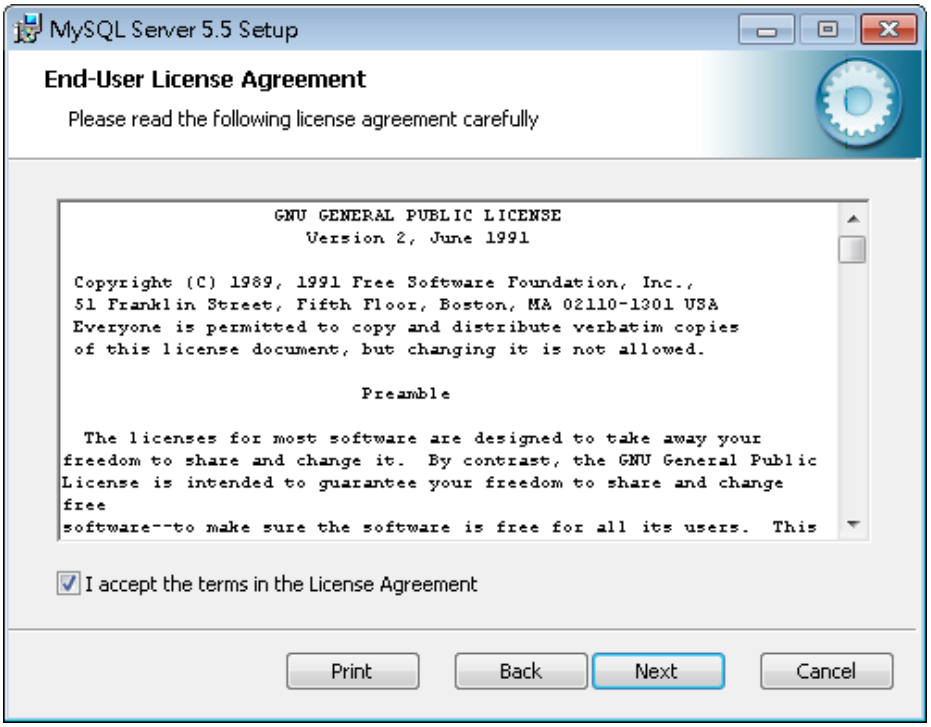
http://www.mysql.com/downloads/mysql/

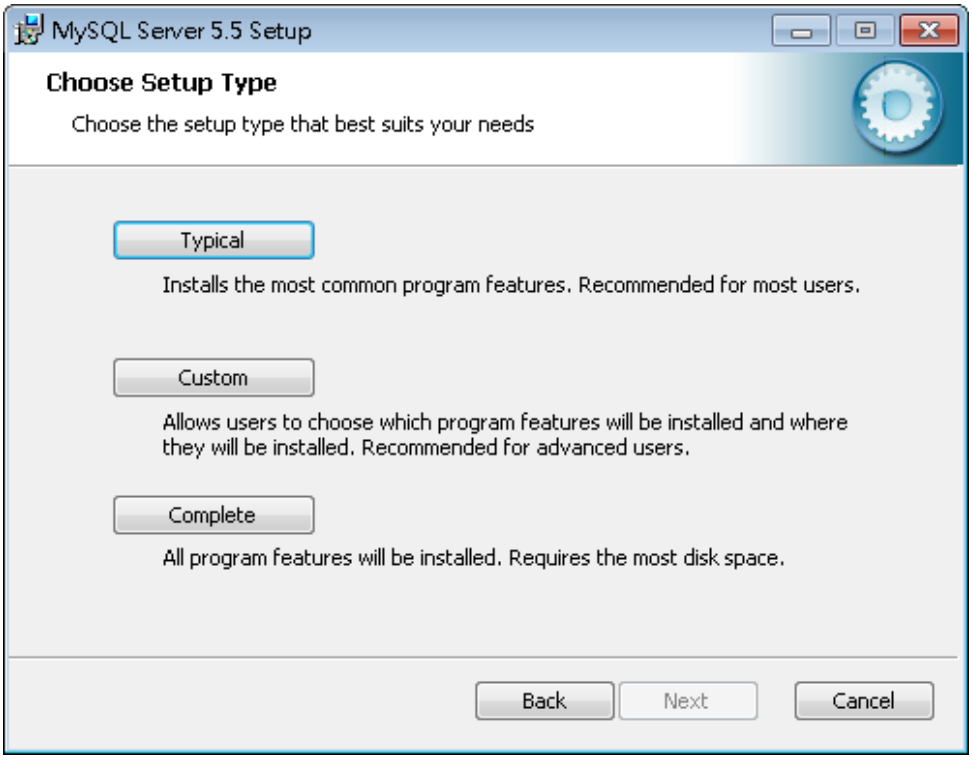
MySql Connector

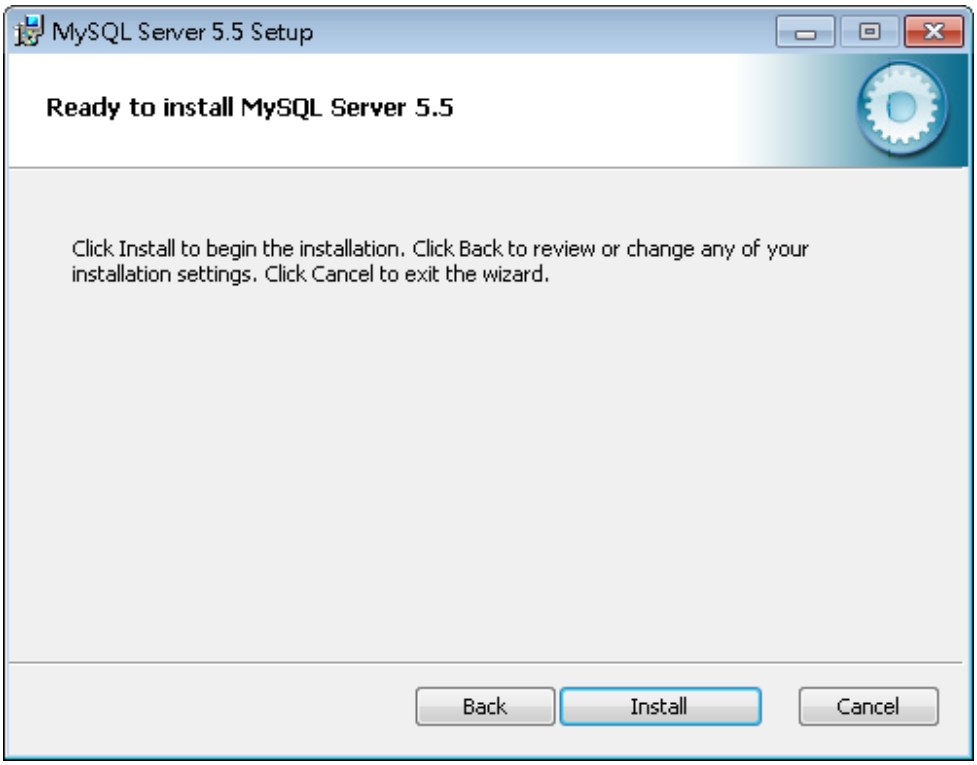
http://www.mysql.com/downloads/connector/net/

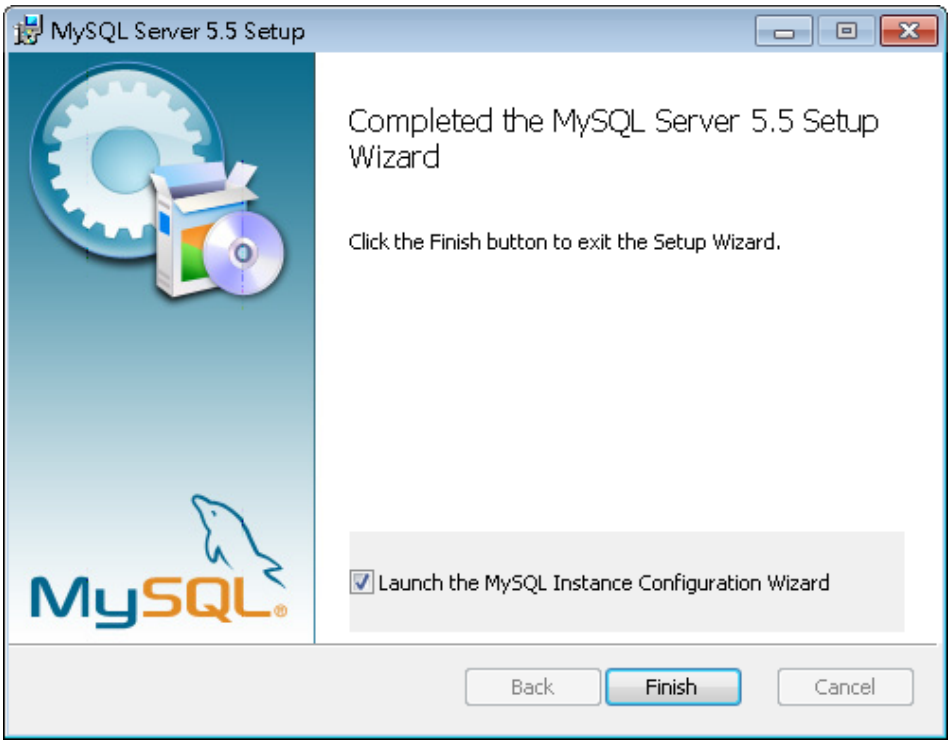
B. 安裝 MySql

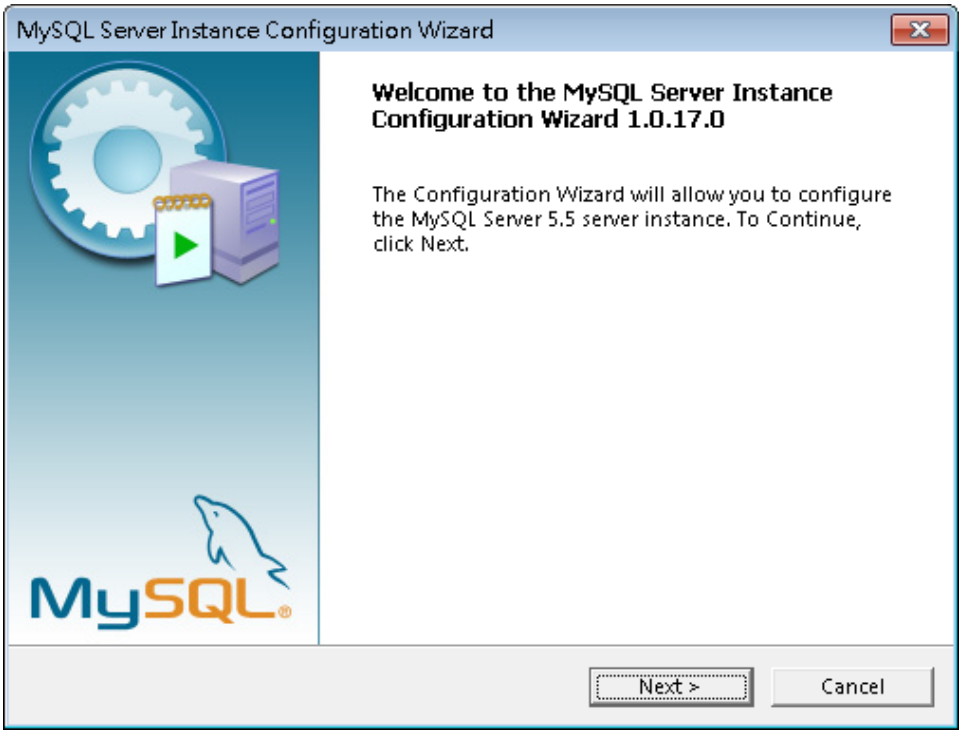

MySQL Server 5.5 Setup
Welcome to the MySQL Server 5.5 Setup Wizard
The Setup Wizard will install MySQL Server 5.5 on your computer. Click Next to continue or Cancel to exit the Setup Wizard.
Copyright (c) 2000, 2011, Oracle and/or its affiliates. All rights reserved.
Back
Next
Cancel

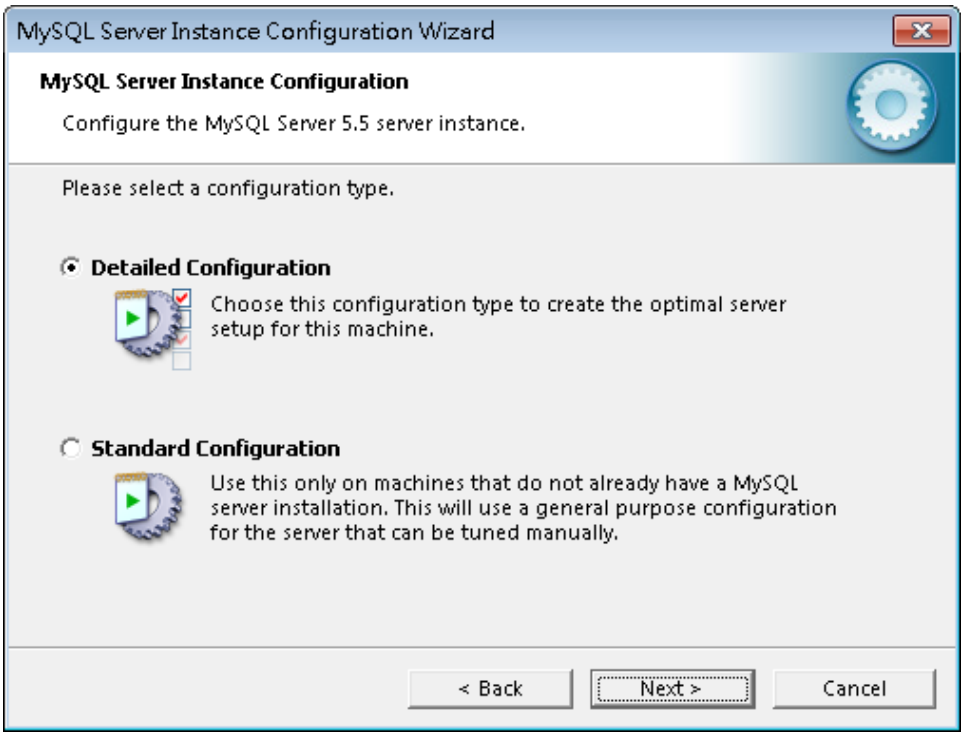

MySQL Server 5.5 Setup
End-User License Agreement
Please read the following license agreement carefully
GNU GENERAL PUBLIC LICENSE
Version 2, June 1991
Copyright (C) 1989, 1991 Free Software Foundation, Inc.,
51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed.
Preamble
The licenses for most software are designed to take away your
freedom to share and change it. By contrast, the GNU General Public
License is intended to guarantee your freedom to share and change
free
software--to make sure the software is free for all its users. This
I accept the terms in the License Agreement
Print
Back
Next
Cancel

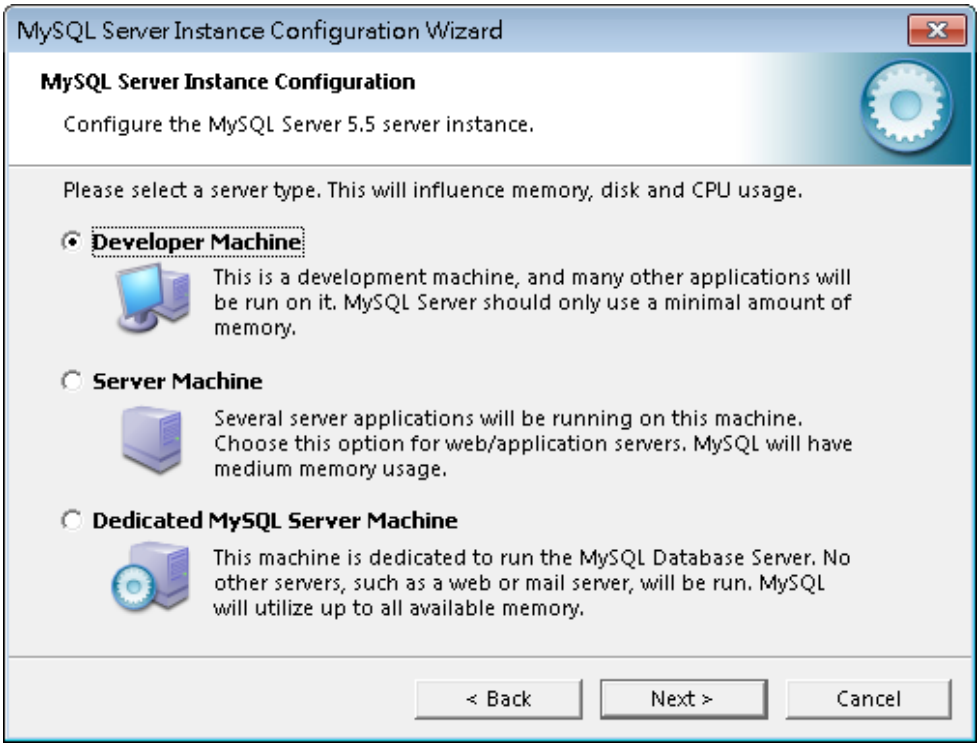

MySQL Server 5.5 Setup
Choose Setup Type
Choose the setup type that best suits your needs
Typical
Installs the most common program features. Recommended for most users.
Custom
Allows users to choose which program features will be installed and where they will be installed. Recommended for advanced users.
Complete
All program features will be installed. Requires the most disk space.
Back
Next
Cancel

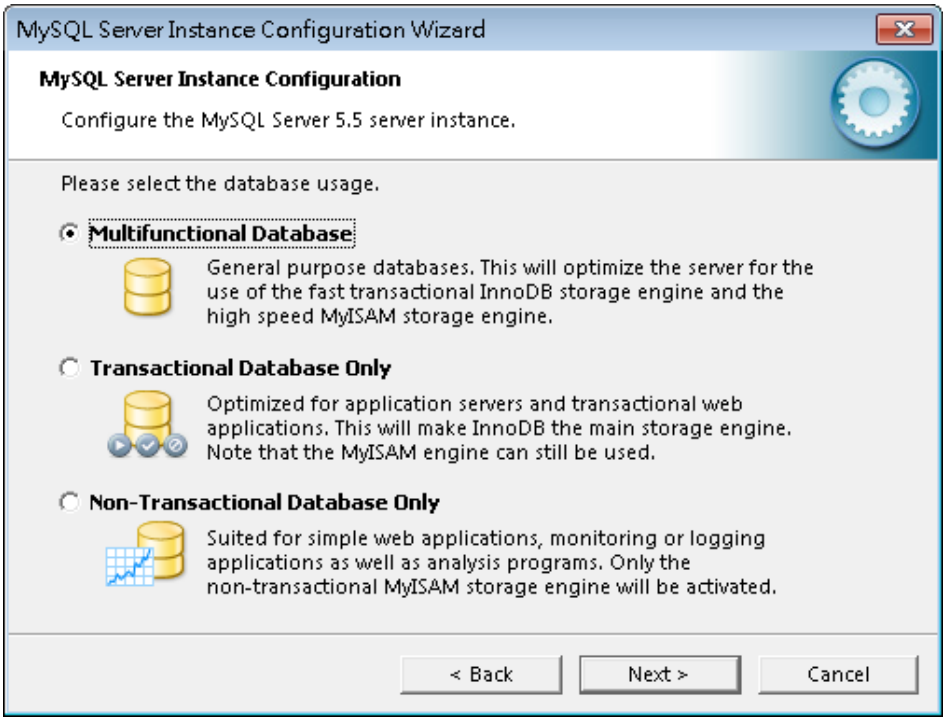

MySQL Server 5.5 Setup
Ready to install MySQL Server 5.5
Click Install to begin the installation. Click Back to review or change any of your installation settings. Click Cancel to exit the wizard.
Back
Install
Cancel

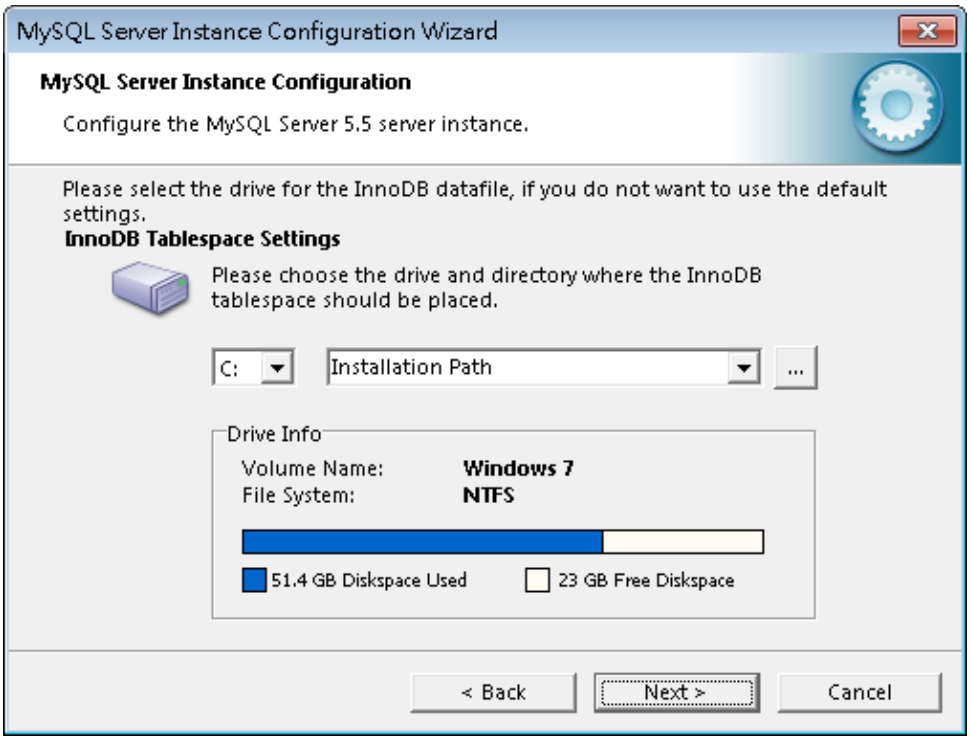

MySQL Server 5.5 Setup
Completed the MySQL Server 5.5 Setup Wizard
Click the Finish button to exit the Setup Wizard.
Launch the MySQL Instance Configuration Wizard
Back
Finish
Cancel

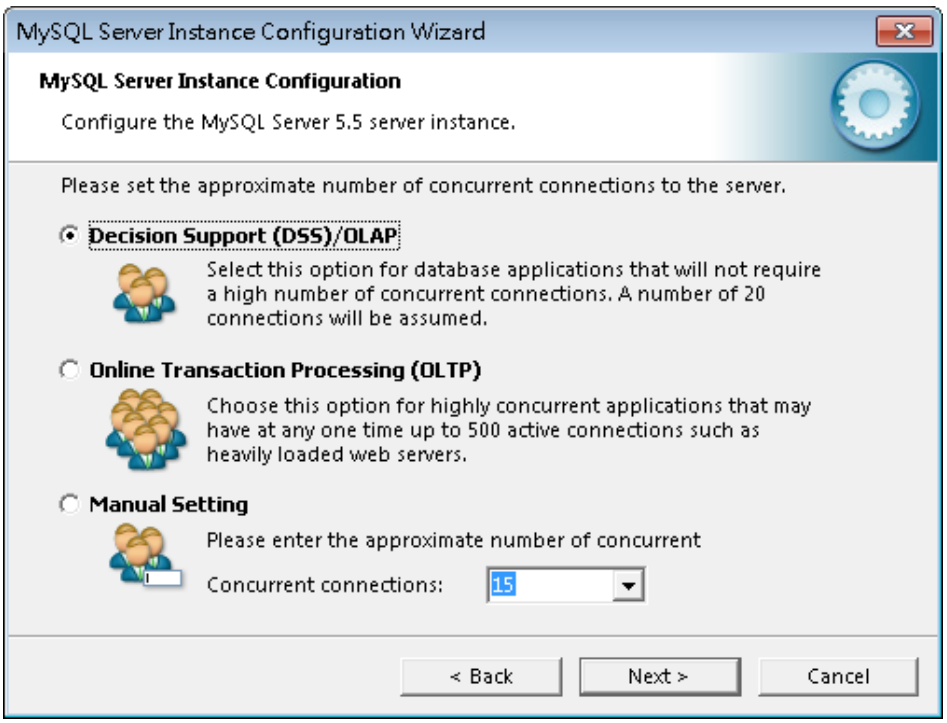

MySQL Server Instance Configuration Wizard
Welcome to the MySQL Server Instance Configuration Wizard 1.0.17.0
The Configuration Wizard will allow you to configure the MySQL Server 5.5 server instance. To Continue, click Next.
Next >
Cancel

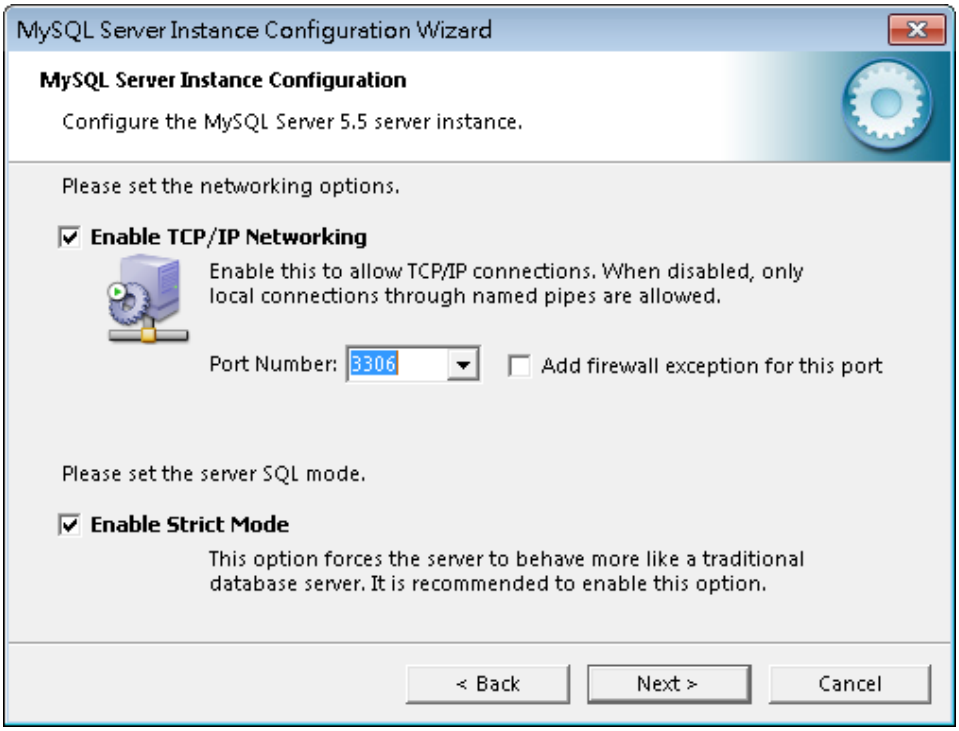

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please select a configuration type.
Detailed Configuration
Choose this configuration type to create the optimal server setup for this machine.
Standard Configuration
Use this only on machines that do not already have a MySQL server installation. This will use a general purpose configuration for the server that can be tuned manually.
< Back
Next >
Cancel

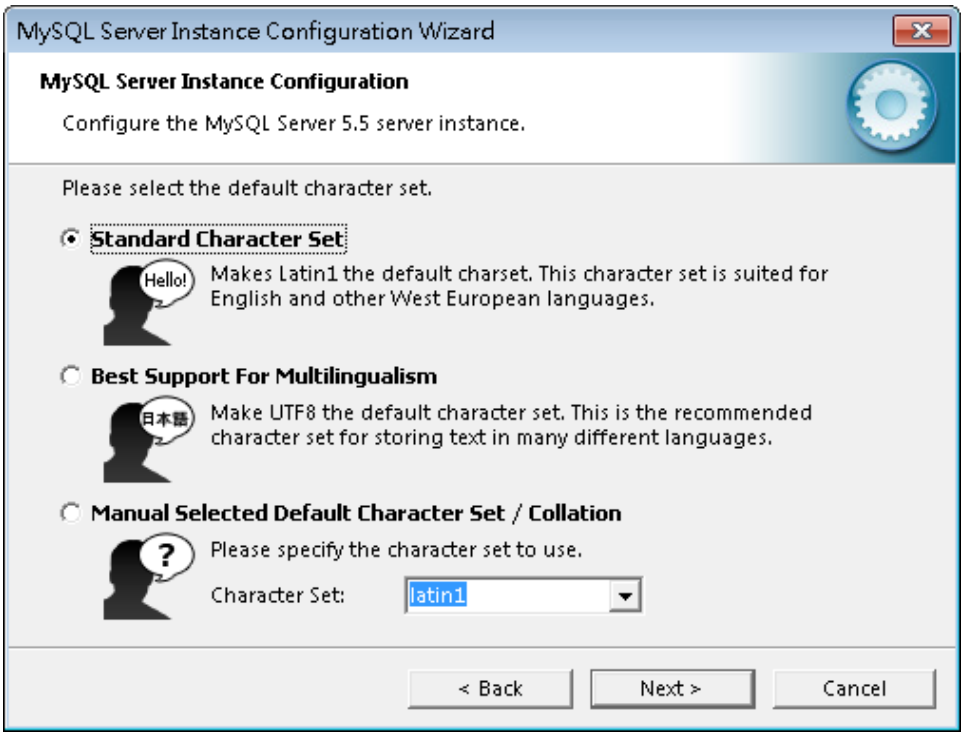

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please select a server type. This will influence memory, disk and CPU usage.
Developer Machine
This is a development machine, and many other applications will be run on it. MySQL Server should only use a minimal amount of memory.
Server Machine
Several server applications will be running on this machine. Choose this option for web/application servers. MySQL will have medium memory usage.
Dedicated MySQL Server Machine
This machine is dedicated to run the MySQL Database Server. No other servers, such as a web or mail server, will be run. MySQL will utilize up to all available memory.
< Back
Next >
Cancel

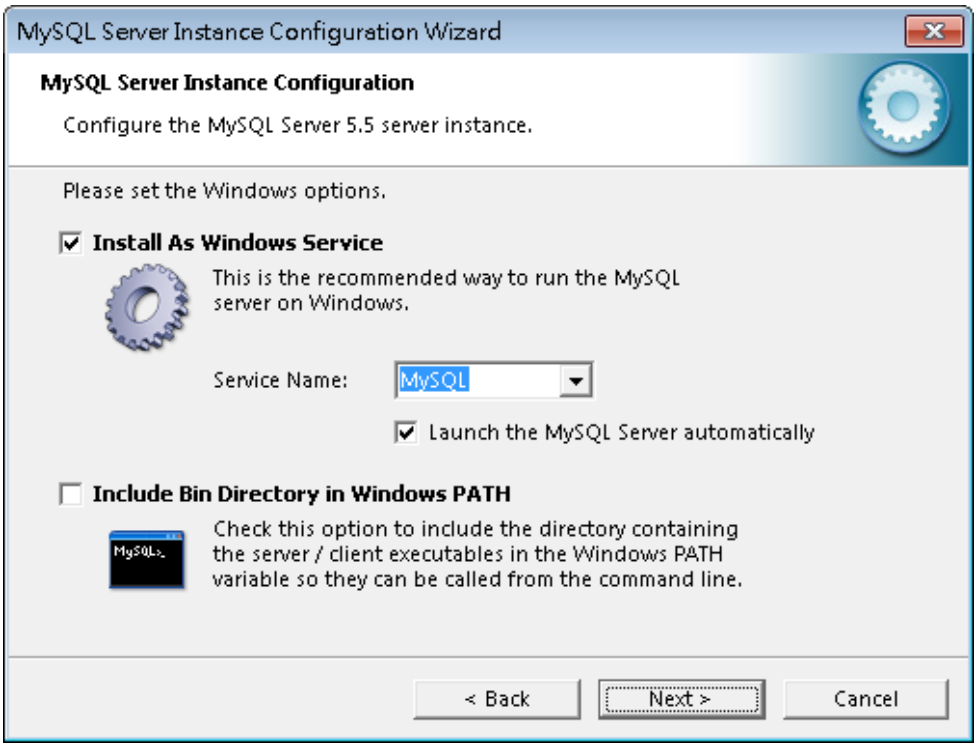

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please select the database usage.
Multifunctional Database
General purpose databases. This will optimize the server for the use of the fast transactional InnoDB storage engine and the high speed MyISAM storage engine.
Transactional Database Only
Optimized for application servers and transactional web applications. This will make InnoDB the main storage engine. Note that the MyISAM engine can still be used.
Non-Transactional Database Only
Suited for simple web applications, monitoring or logging applications as well as analysis programs. Only the non-transactional MyISAM storage engine will be activated.
< Back
Next >
Cancel

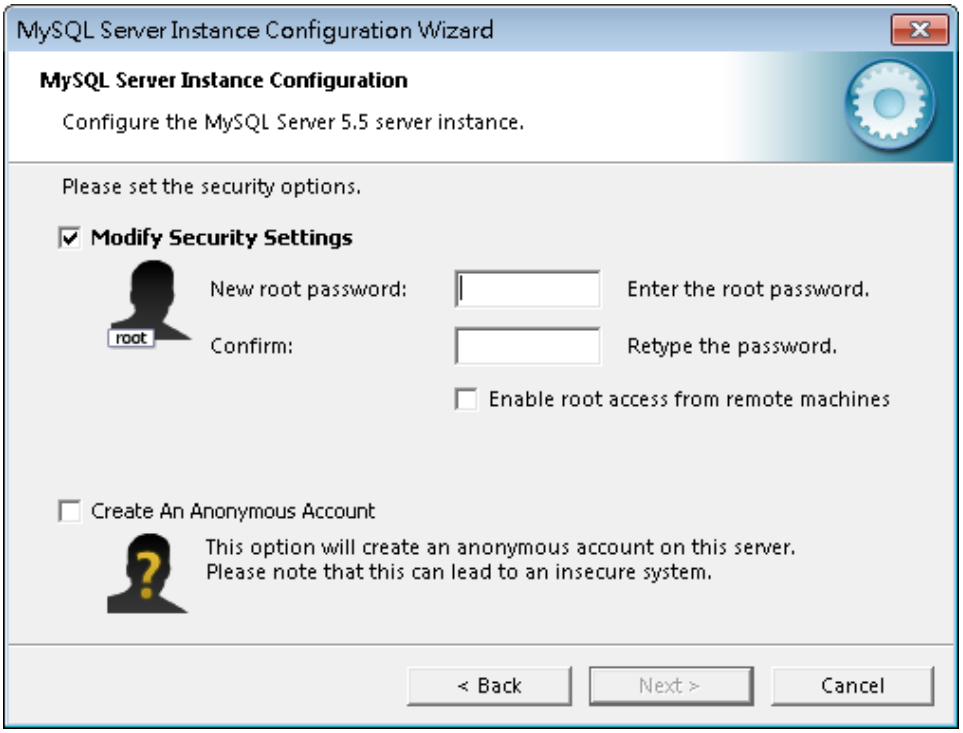

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please select the drive for the InnoDB datafile, if you do not want to use the default settings.
InnoDB Tablespace Settings
Please choose the drive and directory where the InnoDB tablespace should be placed.
C:
Installation Path
...
Drive Info
Volume Name: Windows 7
File System: NTFS
51.4 GB Diskspace Used
23 GB Free Diskspace
< Back
Next >
Cancel

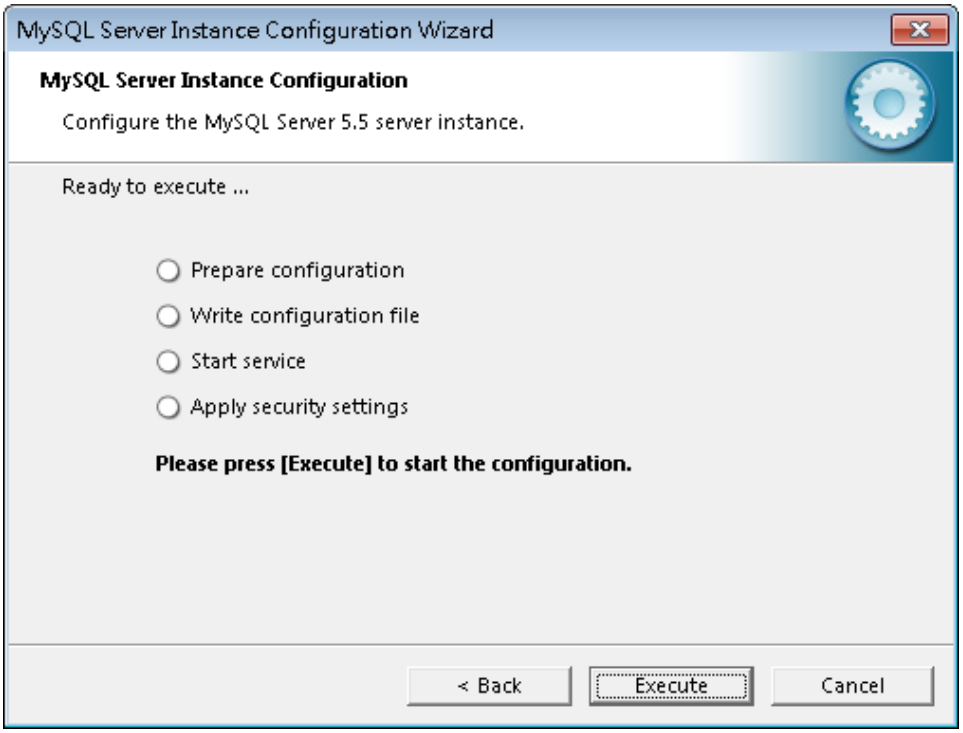

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please set the approximate number of concurrent connections to the server.
Decision Support (DSS)/OLAP
Select this option for database applications that will not require a high number of concurrent connections. A number of 20 connections will be assumed.
Online Transaction Processing (OLTP)
Choose this option for highly concurrent applications that may have at any one time up to 500 active connections such as heavily loaded web servers.
Manual Setting
Please enter the approximate number of concurrent
Concurrent connections:
15
< Back
Next >
Cancel

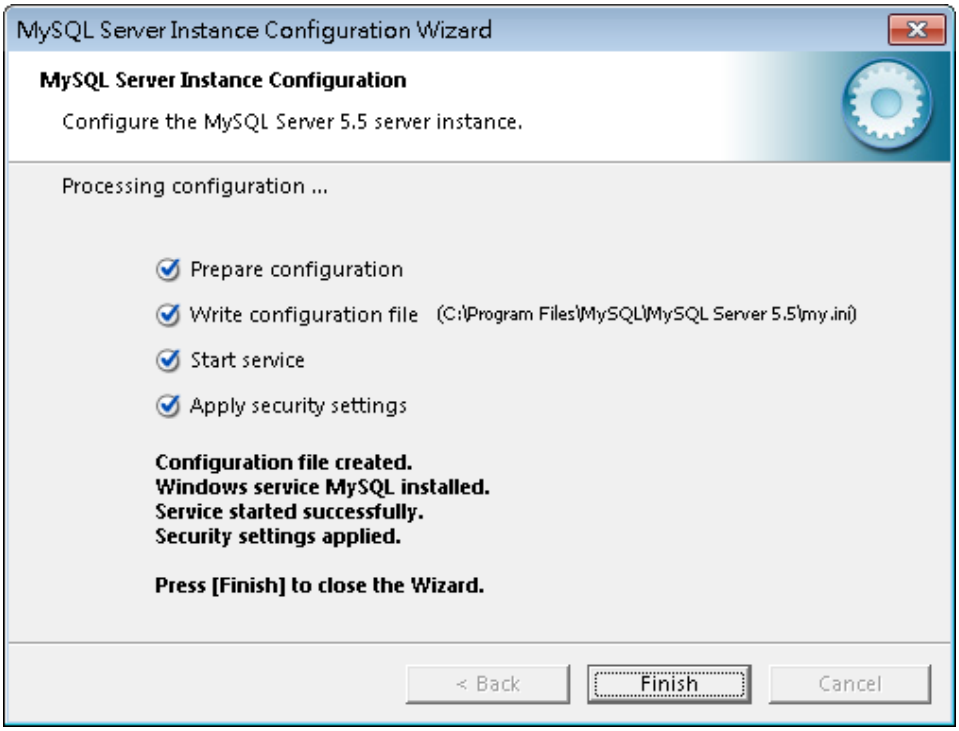

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please set the networking options.
Enable TCP/IP Networking
Enable this to allow TCP/IP connections. When disabled, only local connections through named pipes are allowed.
Port Number:
3306
Add firewall exception for this port
Please set the server SQL mode.
Enable Strict Mode
This option forces the server to behave more like a traditional database server. It is recommended to enable this option.
< Back
Next >
Cancel


MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please select the default character set.
Standard Character Set
Hello!
Makes Latin1 the default charset. This character set is suited for English and other West European languages.
Best Support For Multilingualism
日本語
Make UTF8 the default character set. This is the recommended character set for storing text in many different languages.
Manual Selected Default Character Set / Collation
?
Please specify the character set to use.
Character Set:
latin1
< Back
Next >
Cancel

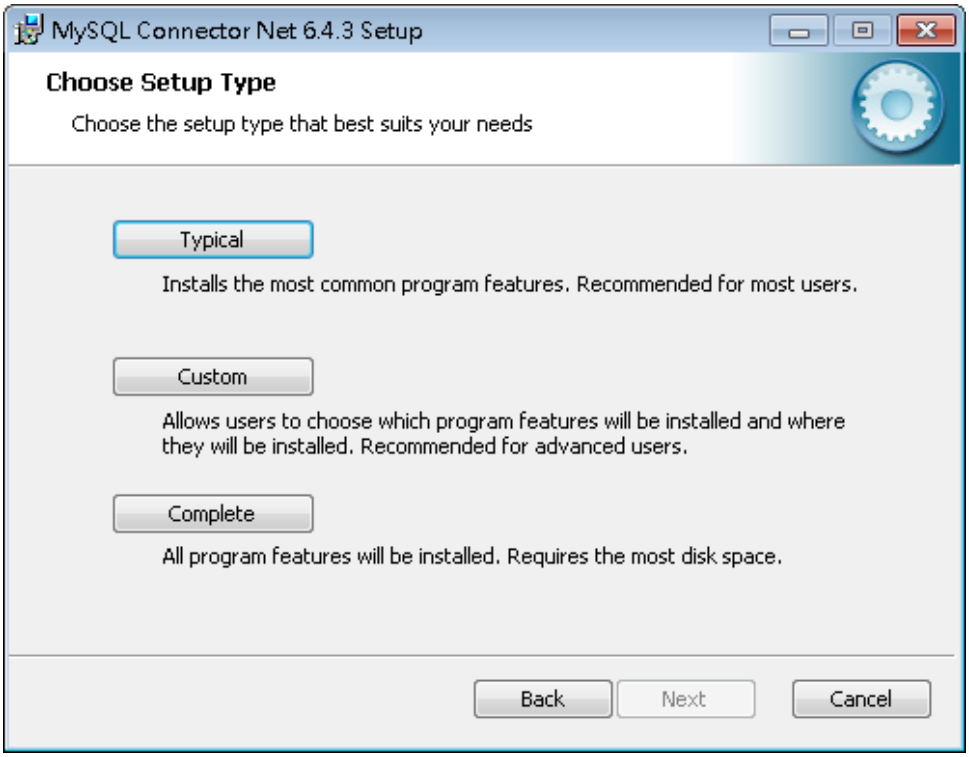

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please set the Windows options.
Install As Windows Service
This is the recommended way to run the MySQL server on Windows.
Service Name:
MySQL
Launch the MySQL Server automatically
Include Bin Directory in Windows PATH
MySQL>_
Check this option to include the directory containing the server / client executables in the Windows PATH variable so they can be called from the command line.
< Back
Next >
Cancel

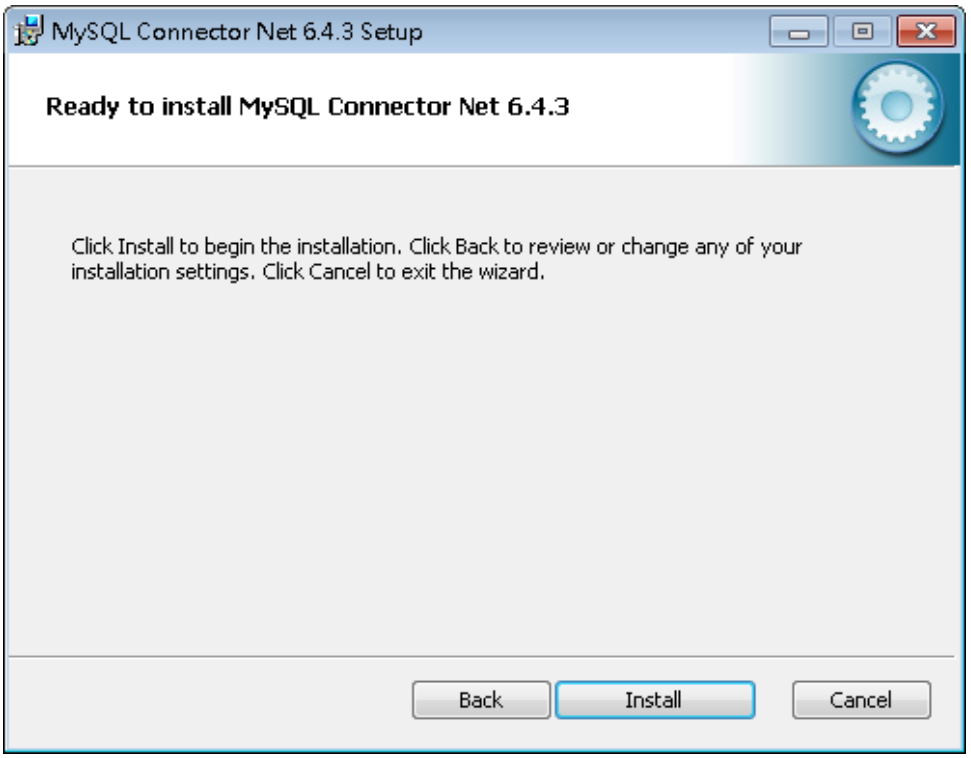

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Please set the security options.
Modify Security Settings
root
New root password:
Enter the root password.
Confirm:
Retype the password.
Enable root access from remote machines
Create An Anonymous Account
This option will create an anonymous account on this server.
Please note that this can lead to an insecure system.
< Back
Next >
Cancel

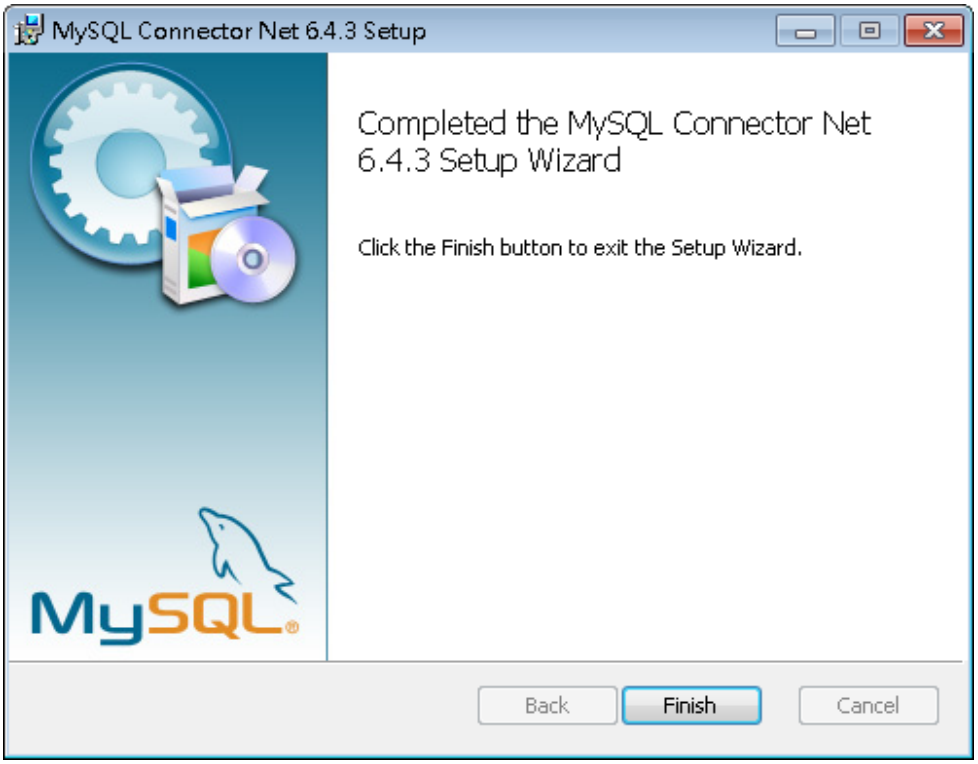

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Ready to execute ...
Prepare configuration
Write configuration file
Start service
Apply security settings
Please press [Execute] to start the configuration.
< Back
Execute
Cancel


MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration
Configure the MySQL Server 5.5 server instance.
Processing configuration ...
Prepare configuration
Write configuration file (C:\Program Files\MySQL\MySQL Server 5.5\my.ini)
Start service
Apply security settings
Configuration file created.
Windows service MySQL installed.
Service started successfully.
Security settings applied.
Press [Finish] to close the Wizard.
< Back
Finish
Cancel

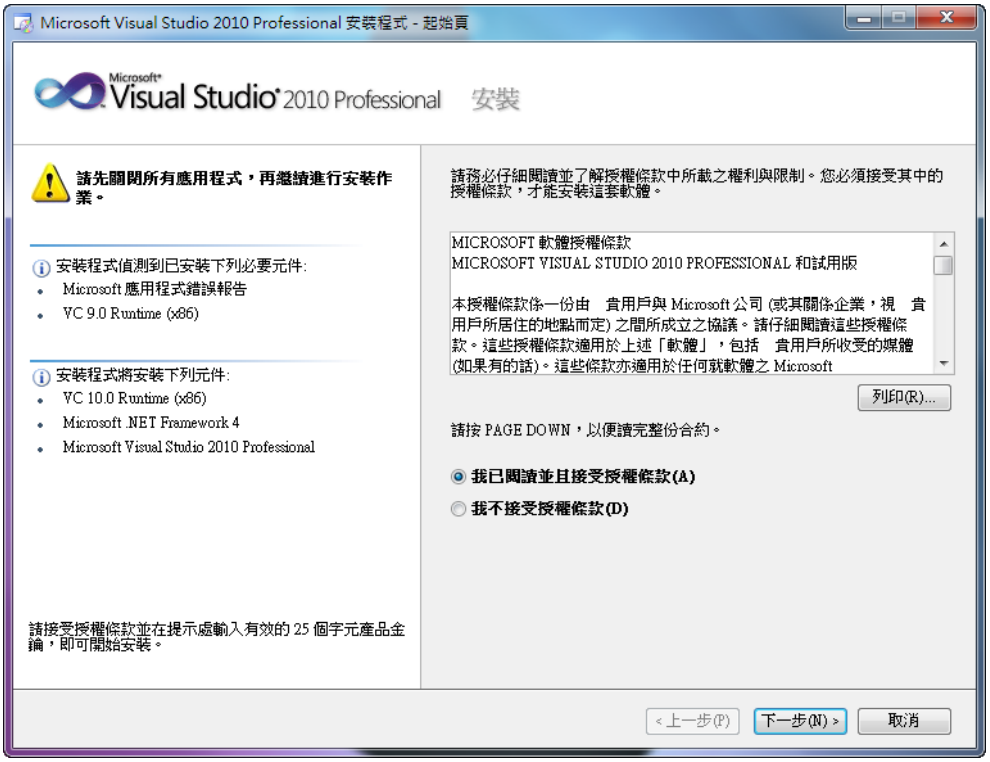
C. 安裝 MySql Connector



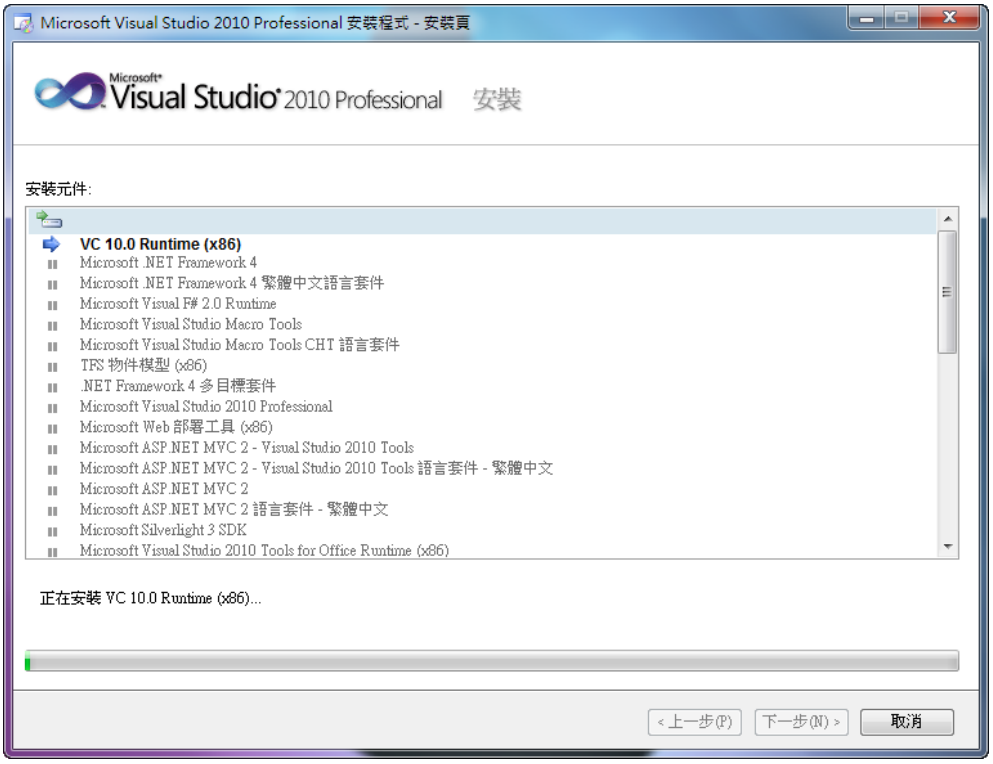

MySQL Connector Net 6.4.3 Setup
Ready to install MySQL Connector Net 6.4.3
Click Install to begin the installation. Click Back to review or change any of your installation settings. Click Cancel to exit the wizard.
Back
Install
Cancel


MySQL Connector Net 6.4.3 Setup
Completed the MySQL Connector Net 6.4.3 Setup Wizard
Click the Finish button to exit the Setup Wizard.
MySQL
Back
Finish
Cancel

D. 安裝 Visual Studio

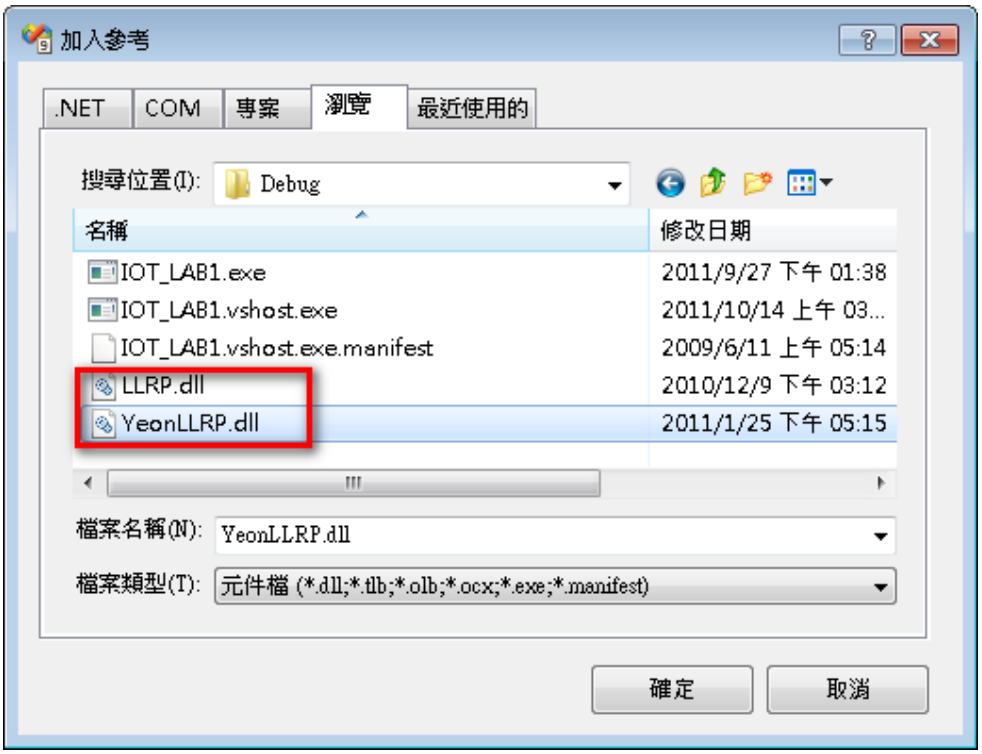


Microsoft Visual Studio 2010 Professional 安裝程式 - 選項頁
Microsoft Visual Studio 2010 Professional 安裝
選擇要安裝的功能(S):
完整(F)
完整的 Visual Studio 安裝。安裝所有的程式語言和工具。
自訂(U)
在下一頁選取要安裝哪些程式語言和工具。
功能描述:
安裝 Visual Studio 2010 Professional 整合式開發環境，以及可以使用 Visual Basic、Visual C#、Visual C++ 或 Visual F# 在 Windows、Web、Azure、Office system、SharePoint 和 SQL Server 上建置方案的元件。同時也包括 SQL Server Express、Windows SDK、Sync Framework、函庫、單元測試工具等等。
產品安裝路徑(R):
C:\Program Files\Microsoft Visual Studio 10.0\
瀏覽(W)...
磁碟空間需求:
磁碟區 磁碟大小 可用空間 所需空間 剩餘
C: 74.4 GB 49.7 GB 6.9 GB 42.8 GB
D: 37.3 GB 33.6 GB 0 個位元組 33.6 GB
< 上一步(P)
安裝(I)
取消


Microsoft Visual Studio 2010 Professional 安裝程式 - 安裝頁
Microsoft Visual Studio 2010 Professional 安裝
安裝元件:
VC 10.0 Runtime (x86)
Microsoft .NET Framework 4
Microsoft .NET Framework 4 繁體中文語言套件
Microsoft Visual F# 2.0 Runtime
Microsoft Visual Studio Macro Tools
Microsoft Visual Studio Macro Tools CHT 語言套件
TFS 物件模型 (x86)
.NET Framework 4 多目標套件
Microsoft Visual Studio 2010 Professional
Microsoft Web 部署工具 (x86)
Microsoft ASP.NET MVC 2 - Visual Studio 2010 Tools
Microsoft ASP.NET MVC 2 - Visual Studio 2010 Tools 語言套件 - 繁體中文
Microsoft ASP.NET MVC 2
Microsoft ASP.NET MVC 2 語言套件 - 繁體中文
Microsoft Silverlight 3 SDK
Microsoft Visual Studio 2010 Tools for Office Runtime (x86)
正在安裝 VC 10.0 Runtime (x86)...
< 上一步(P)
下一步(N) >
取消

Microsoft Visual Studio 2010 Professional 安裝程式 - 完成畫面
Microsoft Visual Studio 2010 Professional 安裝
成功
已完成 Visual Studio 2010 安裝及設定。
安全性注意事項: 強烈建議
同時建議您務必選擇加入 Microsoft Update 服務，以確保您收到本產品和其他 Microsoft 產品的所有可用更新。
閱讀安全性提示
檢視讀我檔案注意事項
檢查 installation log
填滿您的工具箱。
安裝 Visual Studio 組件庫中與 Visual Studio 整合的擴充功能，以進一步增強您的程式開發產能。
只要按一下滑鼠就可取得說明!
按一下下面的按鈕就會啟動 [Help Library 管理員]，引導您完成設定 Visual Studio 的本機說明。詳細資訊...
安裝文件
< 上一步(P)
完成(F)
取消

E. 安裝 RFID library



- 實作點名系統

A. RFID 讀取程式

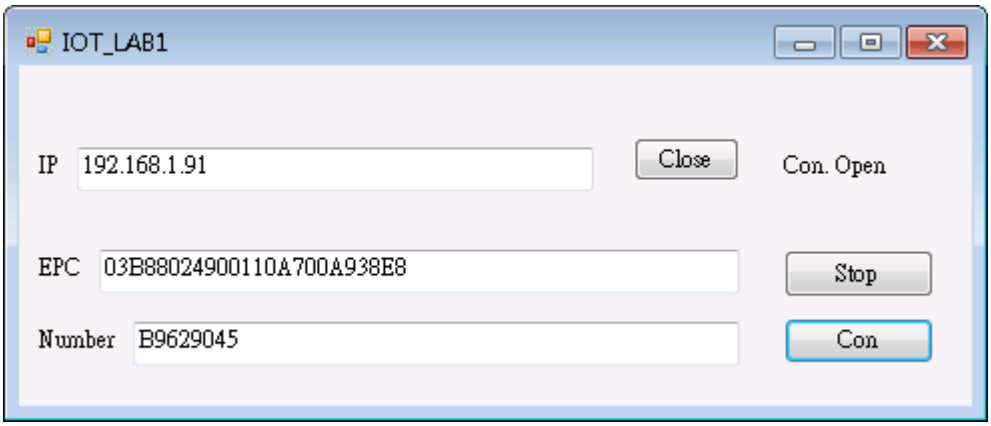
IOT_LAB1

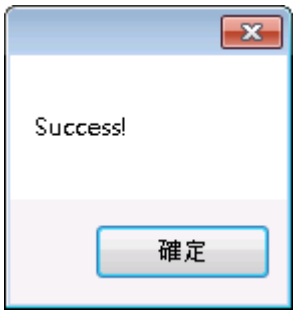
```
// 宣告控制Reader的class
        YeonLLRP.LLRP_library reader = new LLRP_library();
        // 宣告三個 list 並給予初始值
        List<bool> list_antenna = new List<bool> { false, false, true, false };                    //開第
三支天線
        List<int> list_txPower = new List<int> { 0, 0, 50, 0 };
        List<int> list_rxSensitivity = new List<int> { 0, 0, 10, 0 };
    private void tagIn(YeonLLRP.tags_info Tag)   //Tag物件 為收到的單一筆標籤資料
    {
      string str_IO = "Tag In";                    //顯示這是 Tag In
      //由於可能會出現多工的情況,所以必須使用 delegate

                this.Invoke(new delegate_insert_DGV(insert_DGV), (object)Tag.epc,
    (object)Tag.antennaID, (object)Tag.RSSI, (object)str_IO);
}

private void tagOut(YeonLLRP.tags_info Tag)   //Tag物件 為收到的單一筆標籤資料
{
      string str_IO = "Tag Out";                    //顯示這是 Tag Out
      //由於可能會出現多工的情況,所以必須使用 delegate
              this.Invoke(new delegate_insert_DGV(insert_DGV), (object)Tag.epc,
(object)Tag.antennaID, (object)Tag.RSSI, (object)str_IO);
 }
```

B. 連結資料庫程式

```
using MySql.Data;
using MySql.Data.MySqlClient;
~~~~~~~~~~~~~
MySql.Data.MySqlClient.MySqlConnection Con;
string myConnectionString;
myConnectionString = "server=120.126.16.65;uid=iot;" +
"pwd=iot2011;database=iot;";
Con = new
MySql.Data.MySqlClient.MySqlConnection(myConnectionString);
MySqlDataReader Reader;
MySqlCommand cmd = Con.CreateCommand();
Con.Open();
cmd.CommandText = " SQL 指令";
Reader = cmd.ExecuteReader();
```

C. 測試與展示系統


IOT_LAB1
IP
192.168.1.91
Close
Con. Open
EPC
03B88024900110A700A938E8
Stop
Number
B9629045
Con


Success!
確定

- 附錄程式碼

```
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;
using MySql.Data;
using MySql.Data.MySqlClient;
using YeonLLRP;


namespace IOT_LAB1
{
    public partial class IOT_LAB1 : Form
    {
        // 宣告控制Reader的class
        YeonLLRP.LLRP_library reader = new LLRP_library();
        // 宣告三個 list 並給予初始值
        List<bool> list_antenna = new List<bool> { false, false, true, false }; //開第三支天線
        List<int> list_txPower = new List<int> { 0, 0, 50, 0 };
        List<int> list_rxSensitivity = new List<int> { 0, 0, 10, 0 };
        int int_duration; //當值為0時代表不觸發 tagout event,單位 秒

        delegate void delegate_insert_DGV(string str_epc, int antennaID, int RSSI, string str_IO);

        public IOT_LAB1()
        {
            InitializeComponent();
        }

        private void Form1_Load(object sender, EventArgs e)
        {
            reader.event_TagIn += tagIn;
            reader.event_TagOut += tagOut;
        }
```

```
private void button1_Click(object sender, EventArgs e)
{
    try
    {
        if (button1.Text == "Open")
        {
            if (reader.connect(textBox1.Text) == true)     //如果成功連線則顯示連線成功
            {
                Msg.Text="Con. Open";
                button1.Text = "Close";
            }
            else
            {
                Msg.Text="Con. Fail!";
            }
        }
        else
        {
            reader.disconnect(); // 釋放reader資源
            Msg.Text="Con. Close";
            button1.Text = "Open";
        }
    }
    catch
    {
        MessageBox.Show("Can't Open Con. Please check IP address.");
    }
}

private void button2_Click(object sender, EventArgs e)
{
    button2.Enabled = false;

    reader.set_AntennaStatus(list_antenna);          //將天線狀態設定回 reader class
    reader.set_rxSensitivity(list_rxSensitivity);//將敏感度設定回 reader class
    reader.set_txPower(list_txPower);                //將功率設定回 reader class

    if (reader.set_ReaderConfig() == true)   // 執行 set_ReaderConfig,來將我們前面的設定寫到
```

```
Reader
                {
                    //StripLabel_msg.Text = "Reader 設定完成";
                }
                //else
                    //StripLabel_msg.Text = "Reader 設定失敗";

                if (button2.Text.Equals("Read") == true)   //按下 Start Inventory 按鈕
                {
                    int_duration = 0;   //將Tag out duration的值轉換成數字給 int_duration
                    if (int_duration > 0)                          //如果int_duration大於0才須設定
reader.set_tagOutTime
                        reader.set_tagOutTime(int_duration);

                    if (reader.start_Inventory() == true)          //執行start_Inventory(),當回傳 true 即代表成功
執行
                    {
                        button2.Text = "Stop";   //將button文字改為Stop Inventory
                        //label1.Text = "讀取中";              //顯示目前狀態為讀取中
                    }
                }
                else
                {
                    if (reader.stop_Inventory() == true)   //當button文字為Stop Inventory,就是要停止讀取,所以
執行stop_Inventory()
                    {
                        button2.Text = "Read";       //將button文字改為Start Inventory
                        //StripLabel_msg.Text = "停止讀取";              //顯示目前狀態為停止讀取
                    }
                }
                button2.Enabled = true; //button狀態改為enable
            }

            private void tagIn(YeonLLRP.tags_info Tag)   //Tag物件 為收到的單一筆標籤資料
            {
                string str_IO = "Tag In";                      //顯示這是 Tag In
                //由於可能會出現多工的情況,所以必須使用 delegate
```

```
            this.Invoke(new delegate_insert_DGV(insert_DGV), (object)Tag.epc, (object)Tag.antennaID,
(object)Tag.RSSI, (object)str_IO);
        }

        private void tagOut(YeonLLRP.tags_info Tag)   //Tag物件 為收到的單一筆標籤資料
        {
            string str_IO = "Tag Out";                    //顯示這是 Tag Out
            //由於可能會出現多工的情況,所以必須使用 delegate
            this.Invoke(new delegate_insert_DGV(insert_DGV), (object)Tag.epc, (object)Tag.antennaID,
(object)Tag.RSSI, (object)str_IO);
        }

        private void insert_DGV(string str_EPC, int int_antennaID, int int_RSSI, string str_IO)
        {
            textBox2.Text = str_EPC;

        }

        private void button3_Click(object sender, EventArgs e)
        {
            string tmp = textBox2.Text;
            connect_to_db(tmp);
        }

        private void connect_to_db(string EPC)
        {
            MySql.Data.MySqlClient.MySqlConnection conn;
            string myConnectionString;
            myConnectionString = "server=120.126.16.65;uid=iot;" + "pwd=iot2011;database=iot;";
            conn = new MySql.Data.MySqlClient.MySqlConnection(myConnectionString);
            MySqlDataReader Reader;
            MySqlCommand cmd = conn.CreateCommand();
            try
            {
                conn.Open();
                cmd.CommandText = "select * from student_list where EPC = \""+ EPC+"\"" ;
                Reader = cmd.ExecuteReader();
```

```
                if (Reader.HasRows)
                {
                    while (Reader.Read())
                    {
                        //textBox3.Text=Convert.ToString(Reader.GetInt32(0));
                        textBox3.Text = Reader.GetString(1);
                    }
                    Reader.Close();
                    MessageBox.Show("Success!");
                }
                else
                {
                    MessageBox.Show("No Found!");
                }
                conn.Close();

            }
            catch(MySqlException e)
            {
                MessageBox.Show(e.Message);
            }
        }

    }
}
```