



LabVIEW 程式設計

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Outline

- LabVIEW簡介
- LabVIEW基本操作
- 迴圈結構
- 時間延遲

Briefing

- 程式語言的種類有很多，例如C/C++，C#，VB...其中又分為圖形語言與純文字語言。
- LabVIEW 是NI公司研發的程式語言，屬於圖形式語言，底層是由C語言完成。透過接線與介面進行設計，比較容易上手。
- LabVIEW 的特色在於軟體與硬體的整合，可以讓我們透過虛擬的方式模擬硬體，也可以和直接和硬體整合進行資料擷取與輸出等等。

Virtual instrument

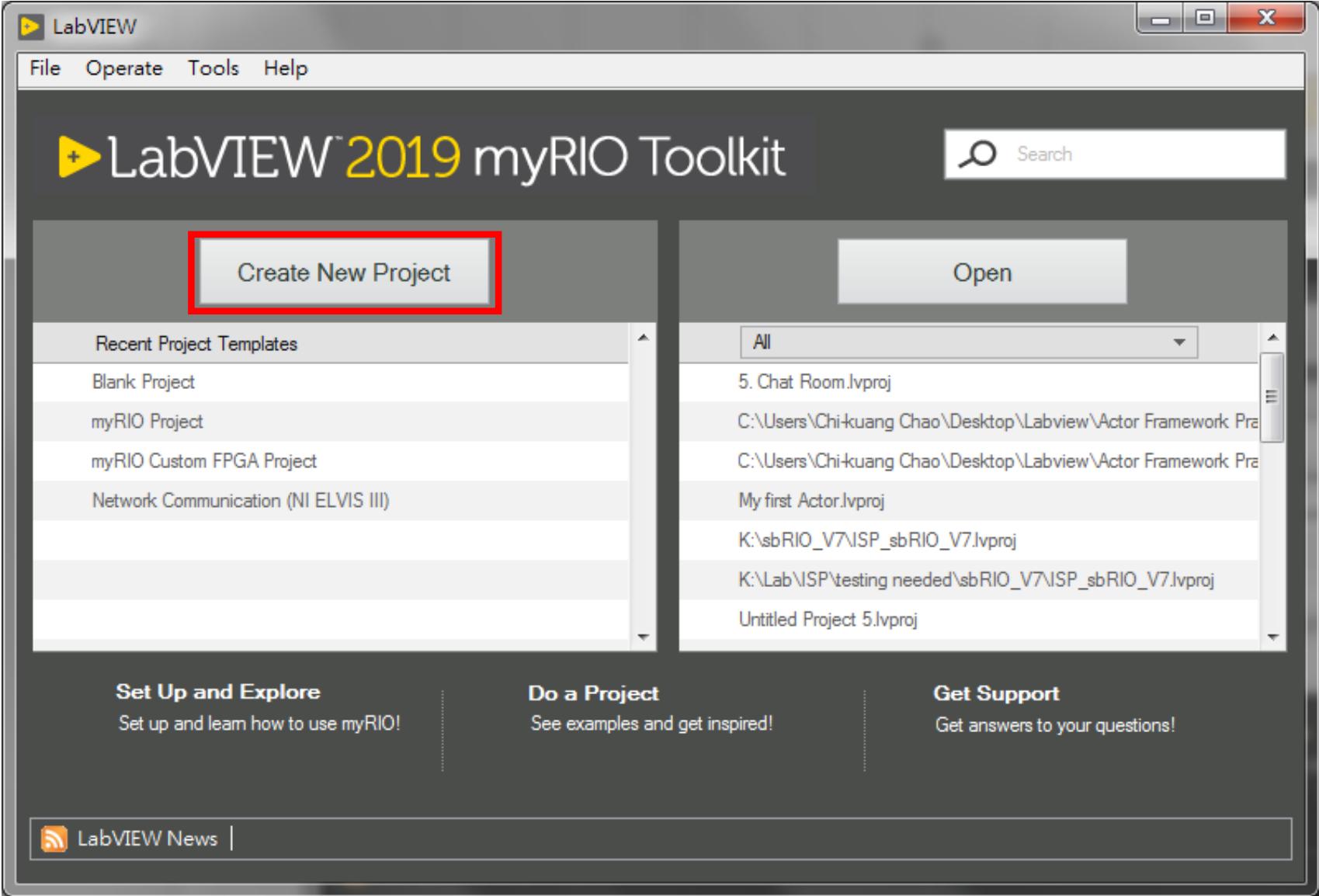
- **Front Panel**
Controls = 輸入端
Indicators = 輸出端
- **Block Diagram**
將 Front Panel 端的物件程式化，組織成想要達成的功能。

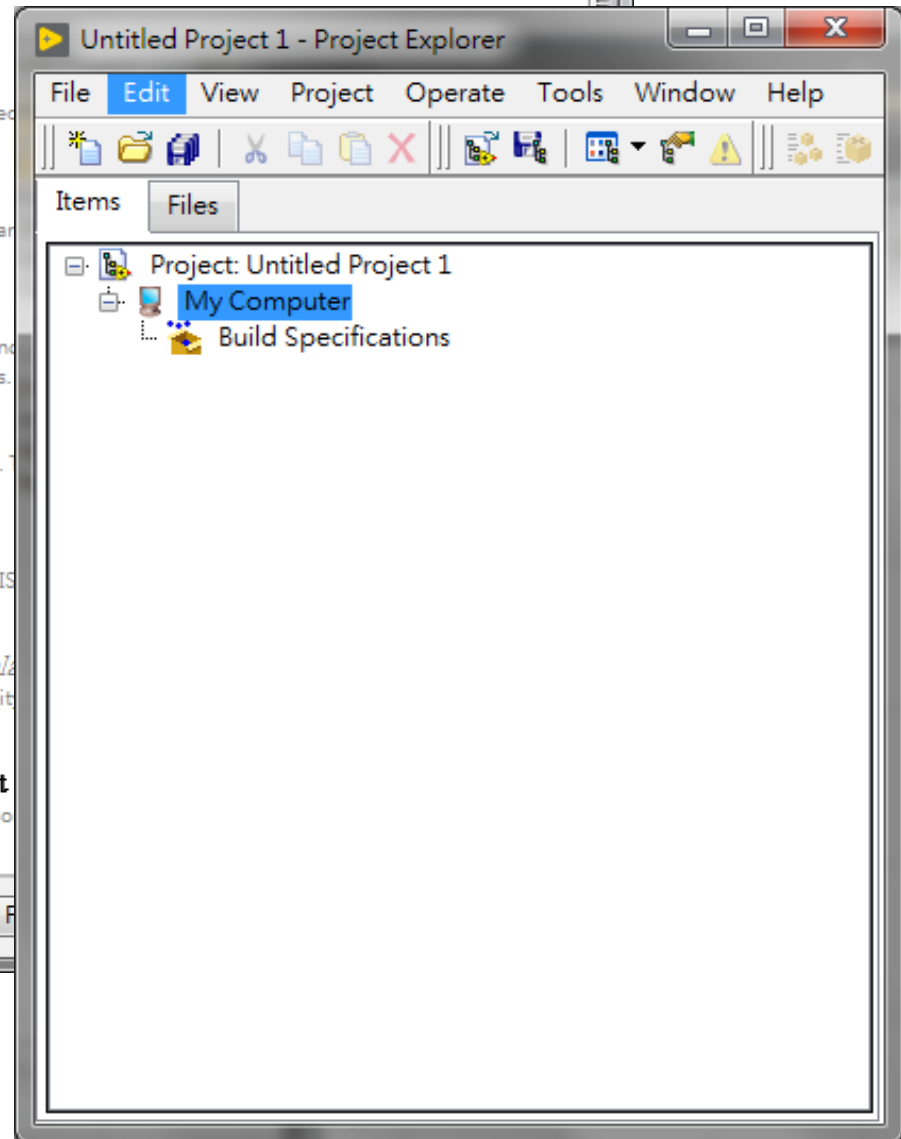
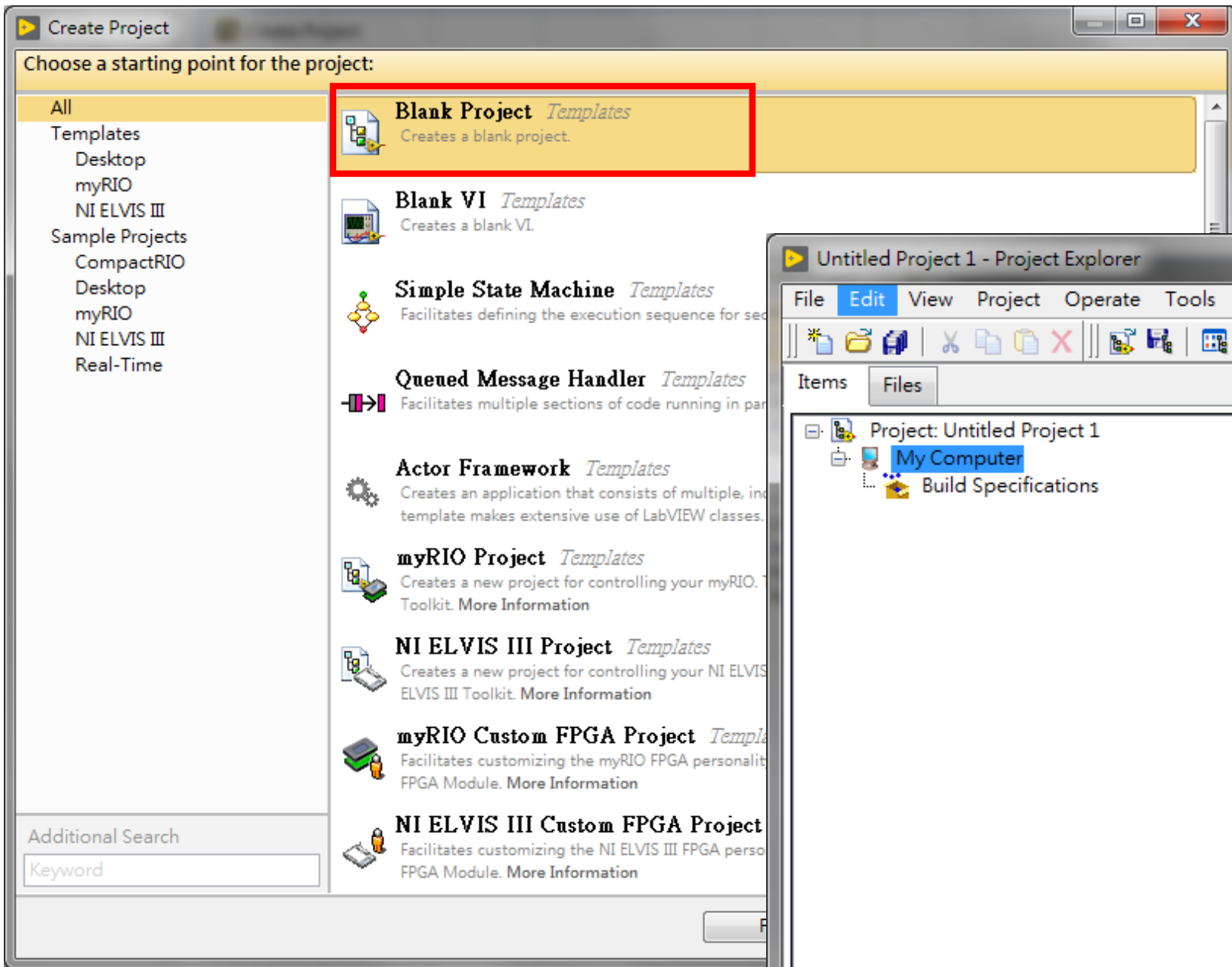


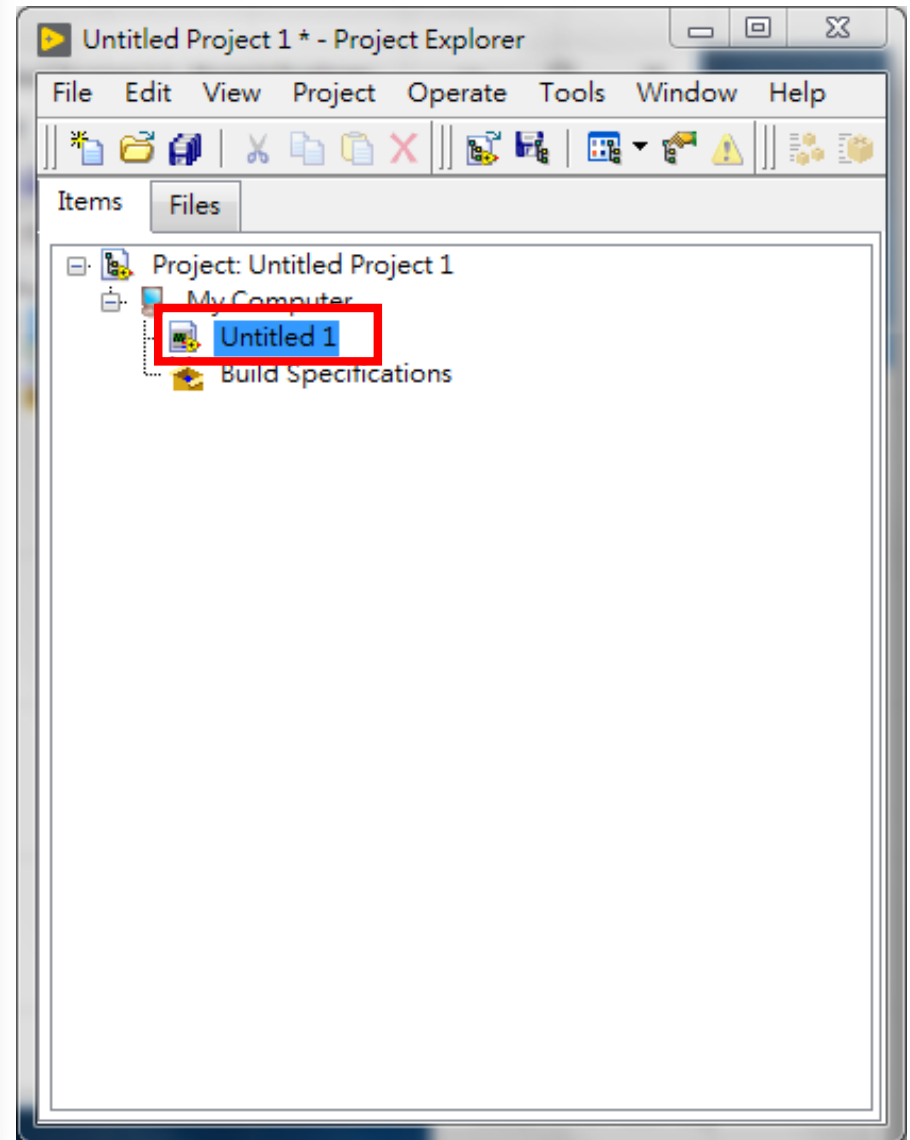
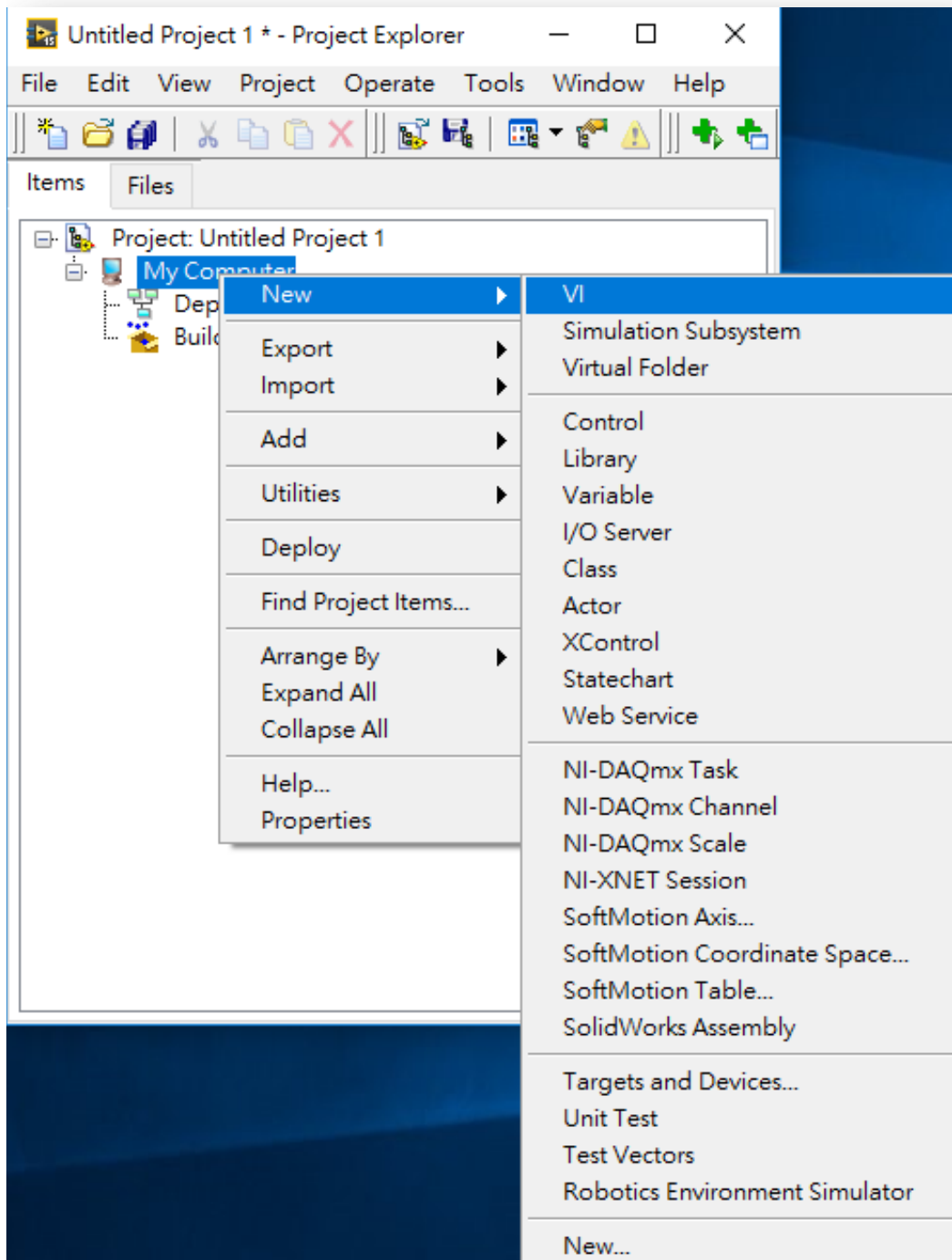
LabVIEW Basic operation

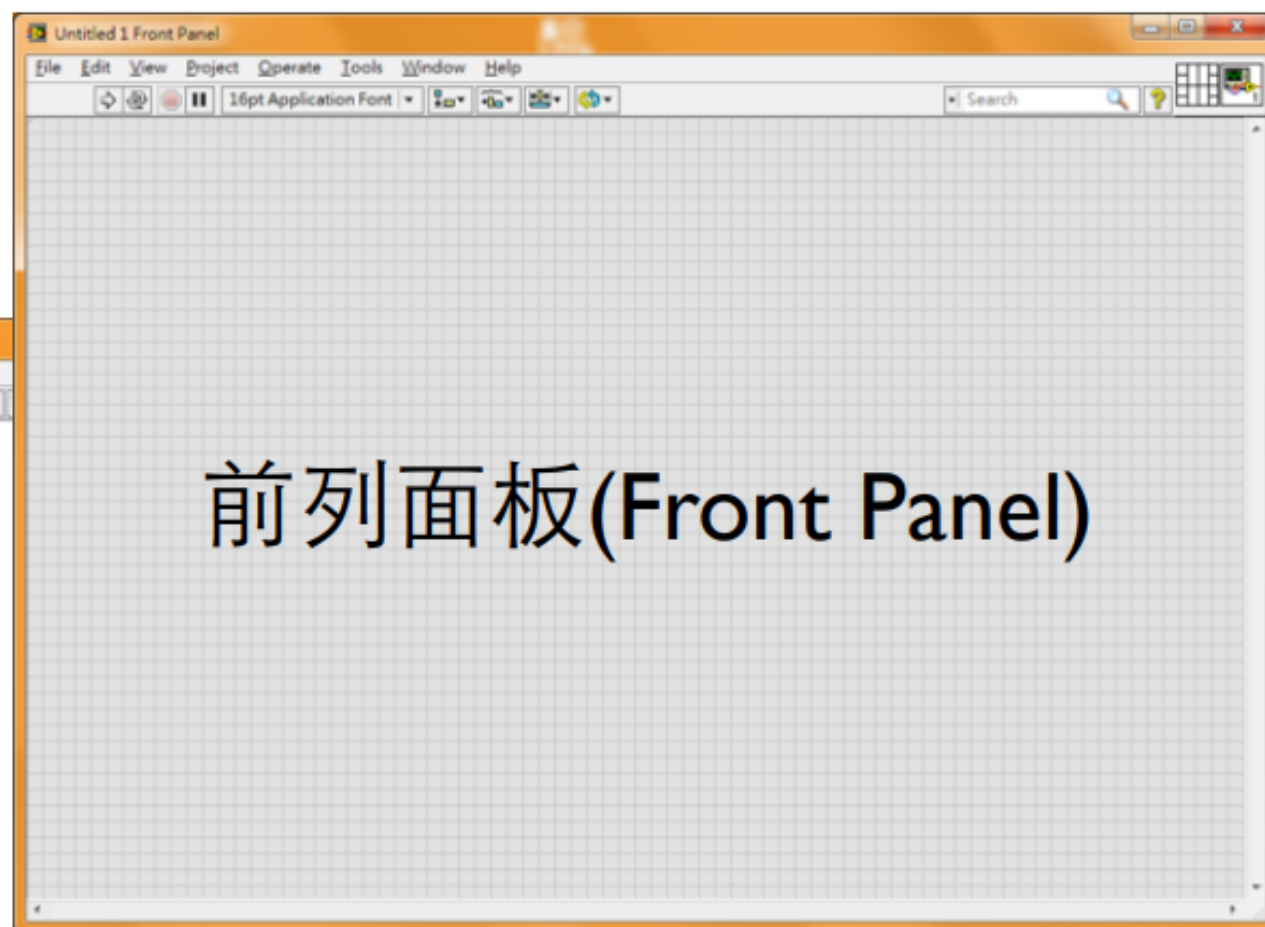
Open LabVIEW

- 開始
 - > 所有程式
 - > National Instruments
 - > LabVIEW2019









Front Panel

Front Panel
Toolbar

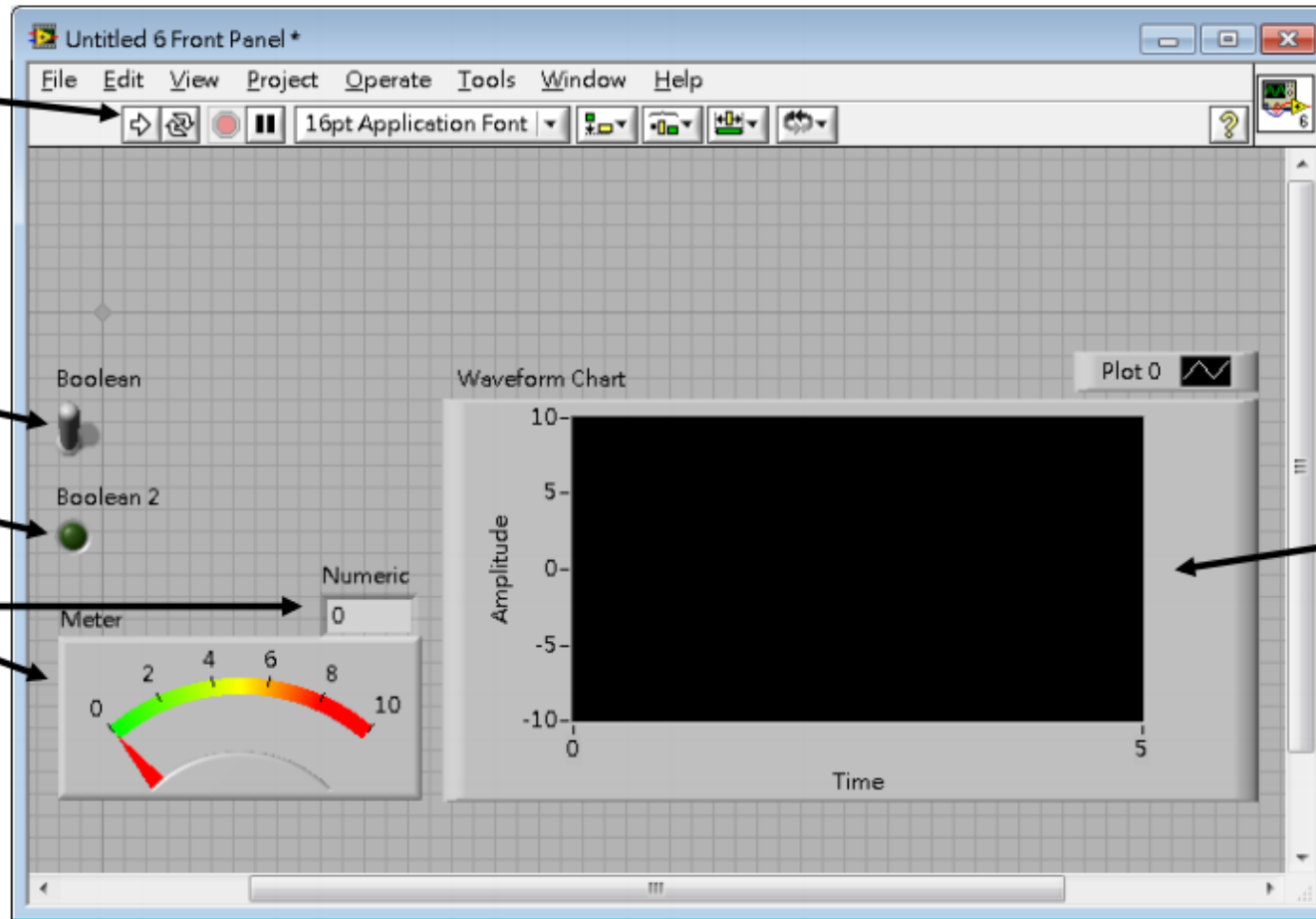
Icon

Boolean
Control

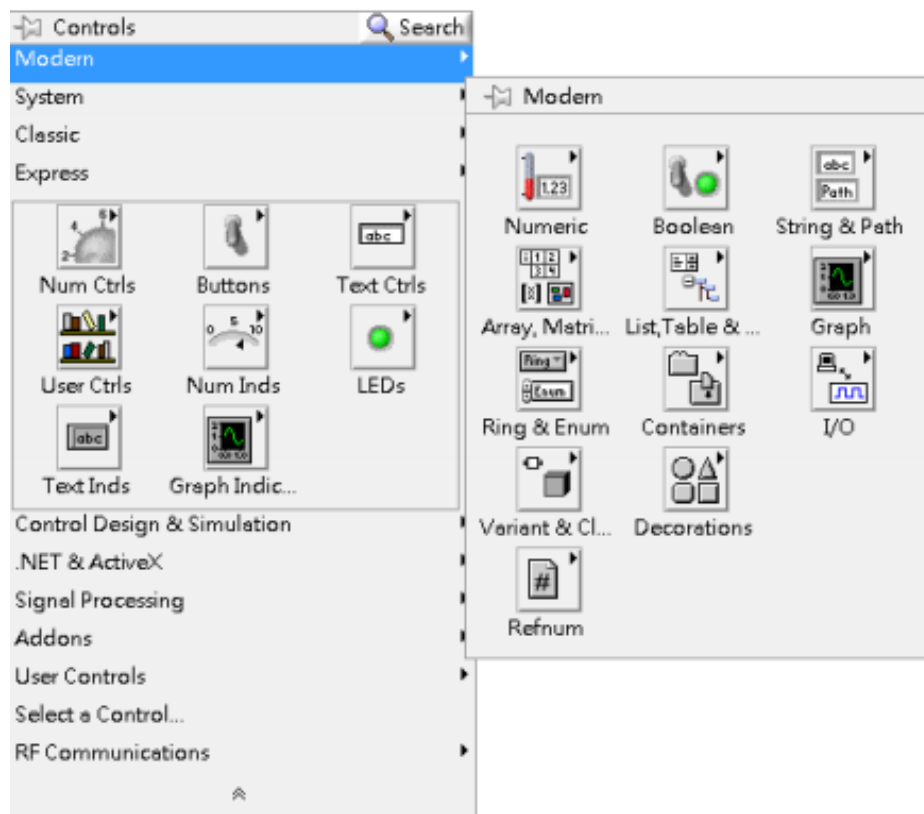
Boolean

Numeric

Waveform
Graph

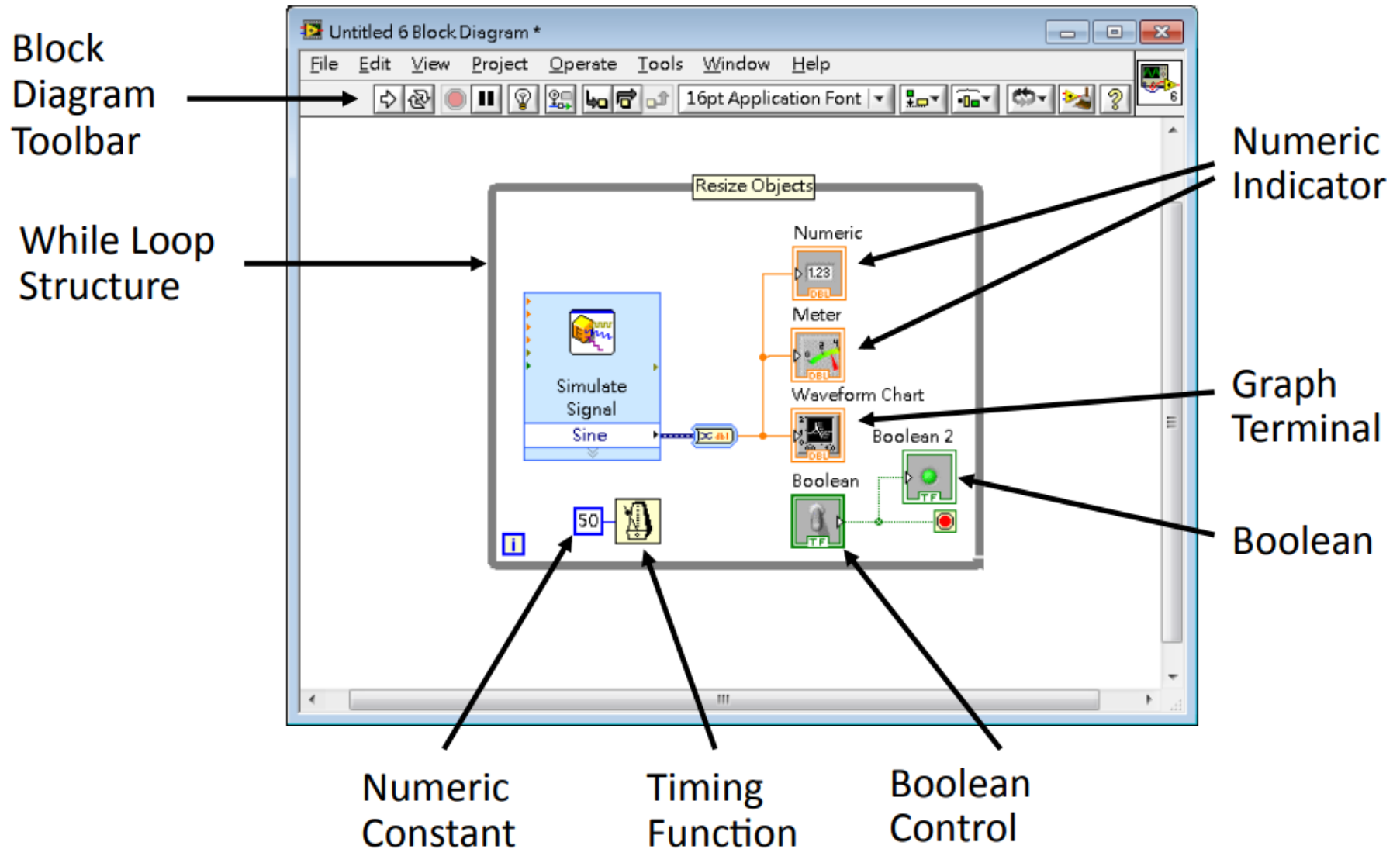


Front Panel - 控制選單

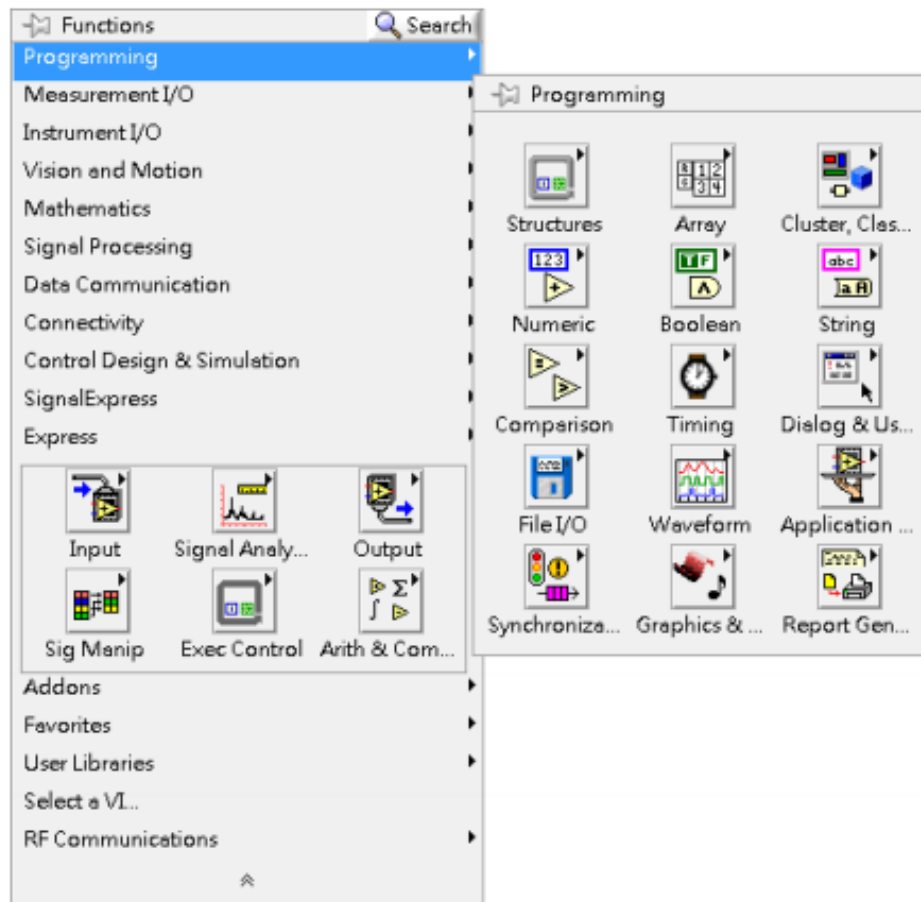


- Modern
 - Numeric (一般數值)
 - Boolean (布林值)
 - String (字串)
 - Array & Cluster (陣列與叢集)
 - Graph (圖形)
 - Enum (選單)
 - I/O (輸入/輸出)

Block Diagram

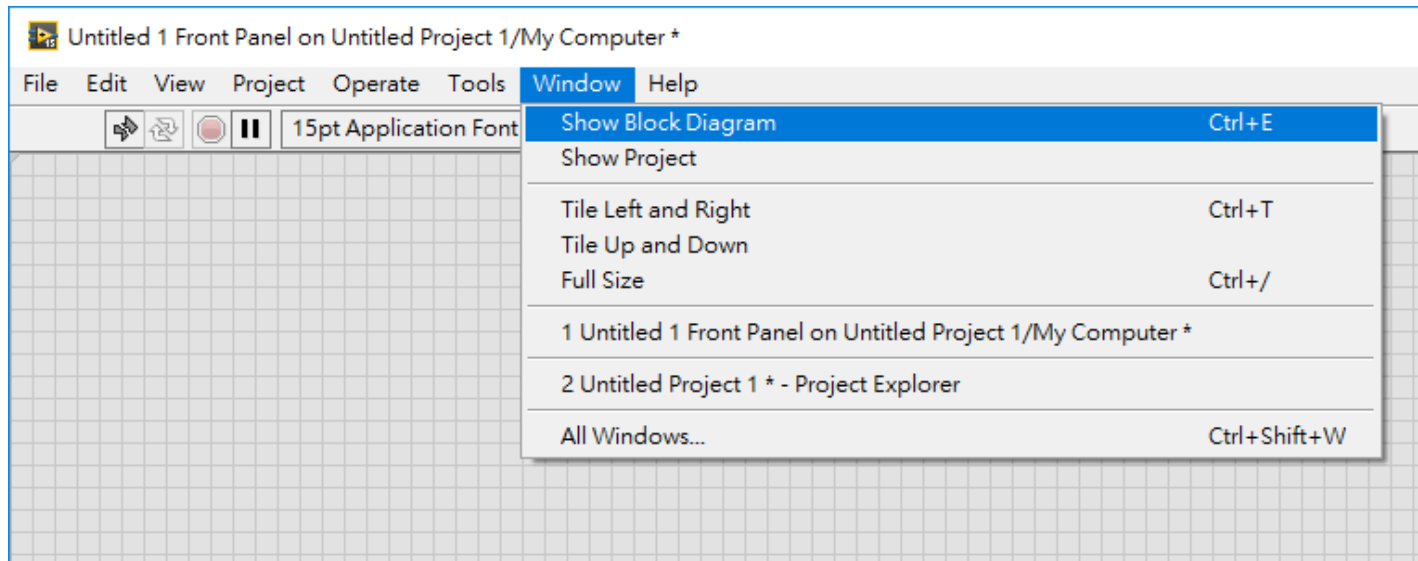


Block Diagram - 控制選單



- Programming
 - Structures
 - Array
 - Cluster
 - Numeric
 - Boolean
 - String
 - Comparison
 - Timing
 - File I/O

Panel Switch- 面板切換



- Switch Block Diagram/Front Panel : Ctrl + E
- Show Block Diagram & Front Panel : Ctrl + T

工具列



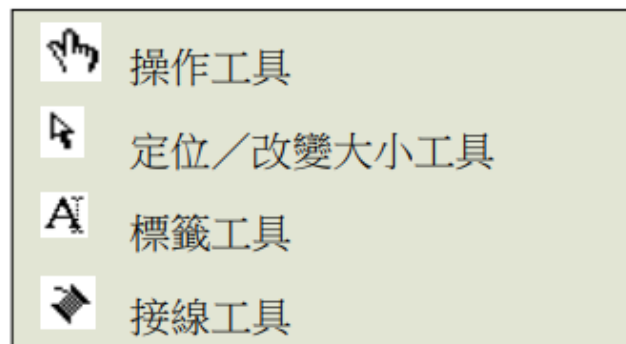
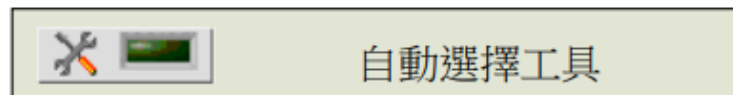
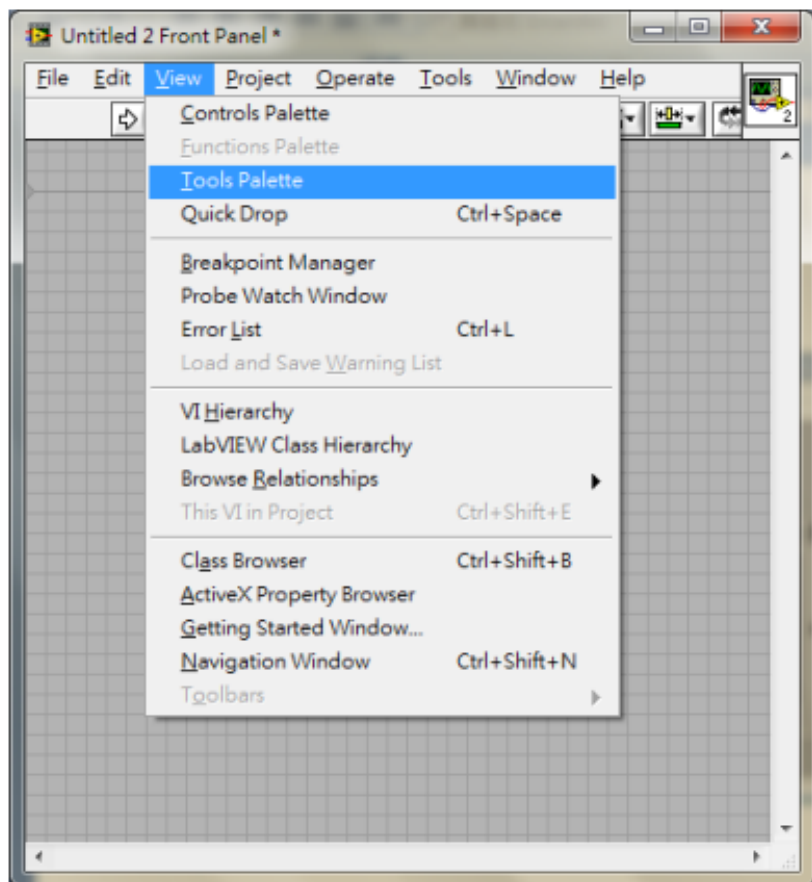
執行
連續執行
中止程式
暫停/繼續

執行細流
測值探針

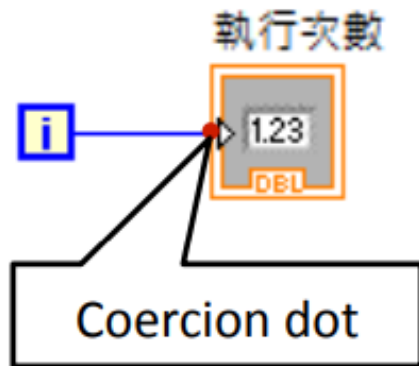
字體設定

調準、對準
分佈
Resize ring
自動整理
Context Help

工具面板












Data pattern

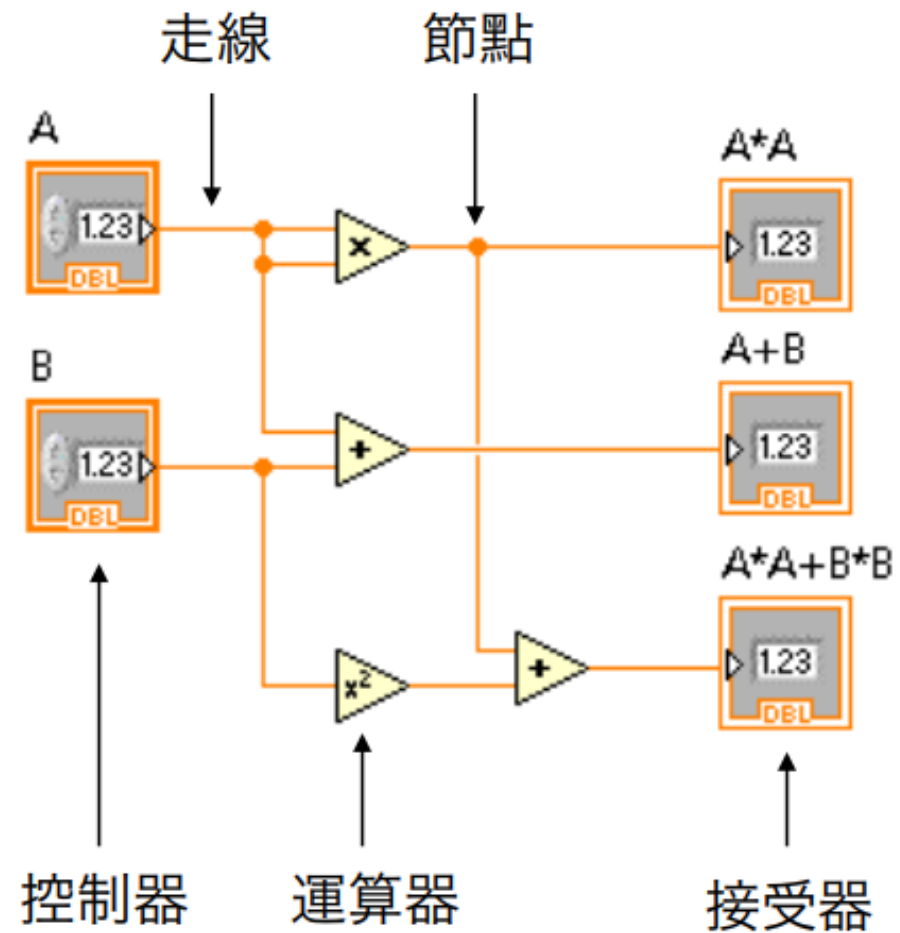
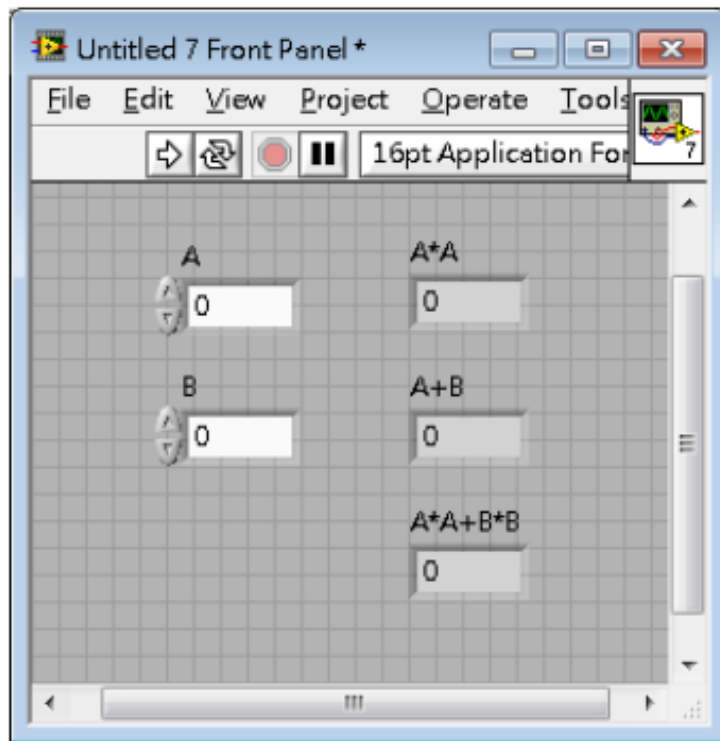


Coercion dot的產生是因為輸入端與輸出端之間的資料型態不一致所造成，Coercion dot會製造一塊記憶體來做資料型態的轉換，在程式開發時應盡量避免Coercion dot的產生。

Description

	單值	一維陣列	二維陣列
Numeric			
Boolean			
String			

Build up VI

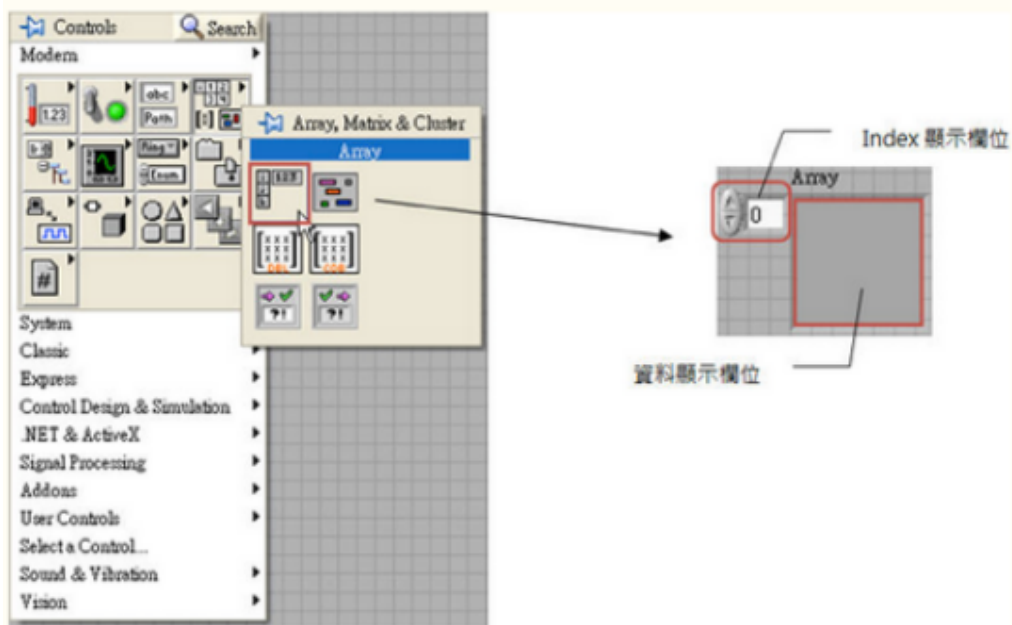


Labview shortcut

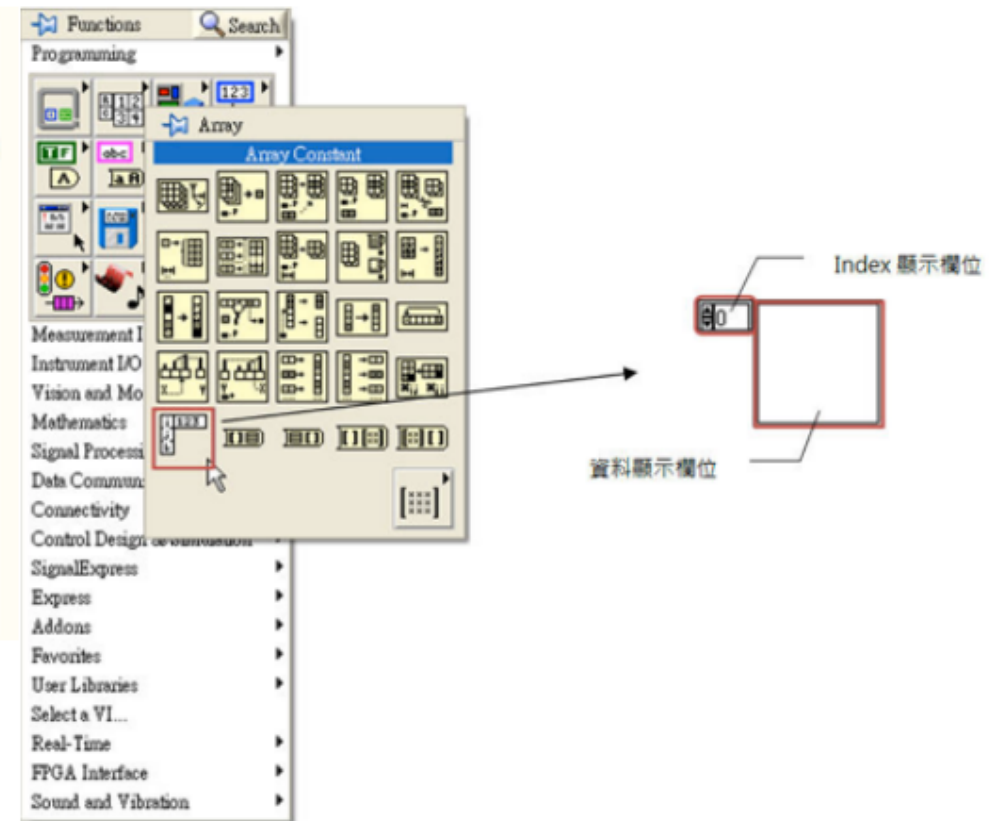
Shortcut	Function
Ctrl + R	Run VI
Ctrl + B	Remove Broken Wires
Ctrl + E	Show Front Panel
Ctrl + T	Tile left and right
Ctrl + A	Align Item
Ctrl + 滑鼠左鍵(Drag Free Space)	Increase spacing
Ctrl + 滑鼠左鍵(Drag Item)	Copy Item
Ctrl + Alt + 滑鼠左鍵(Drag Free Space)	Decrease spacing
Shift + 滑鼠右鍵	Tool Palette

Array

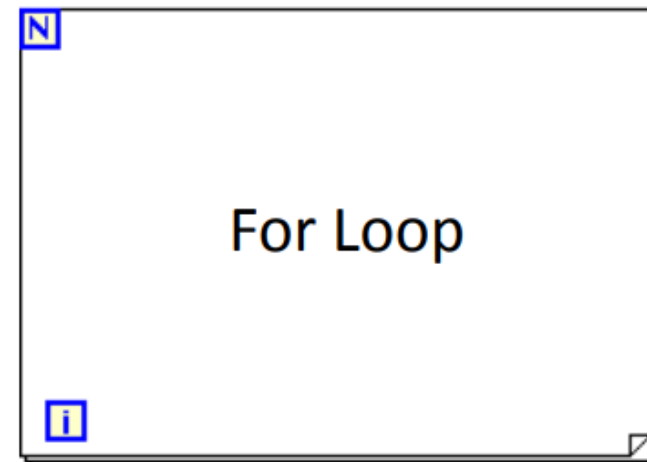
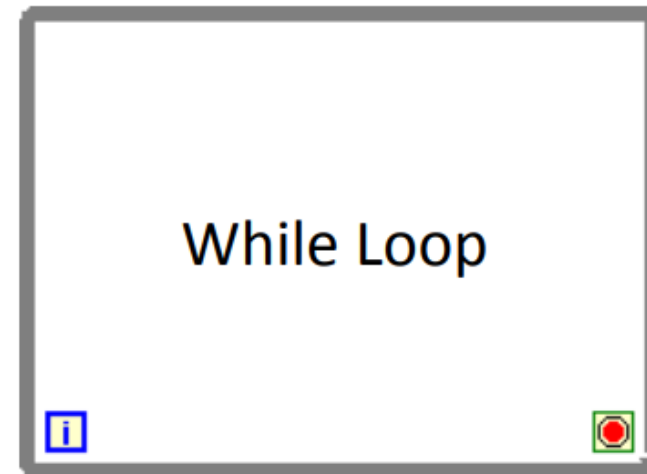
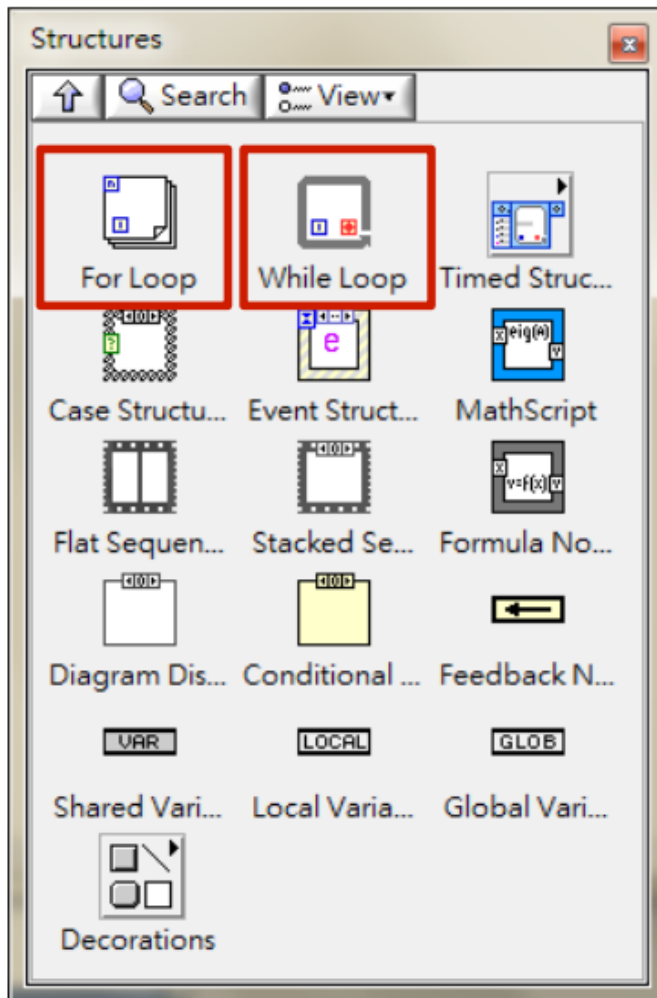
Front panel



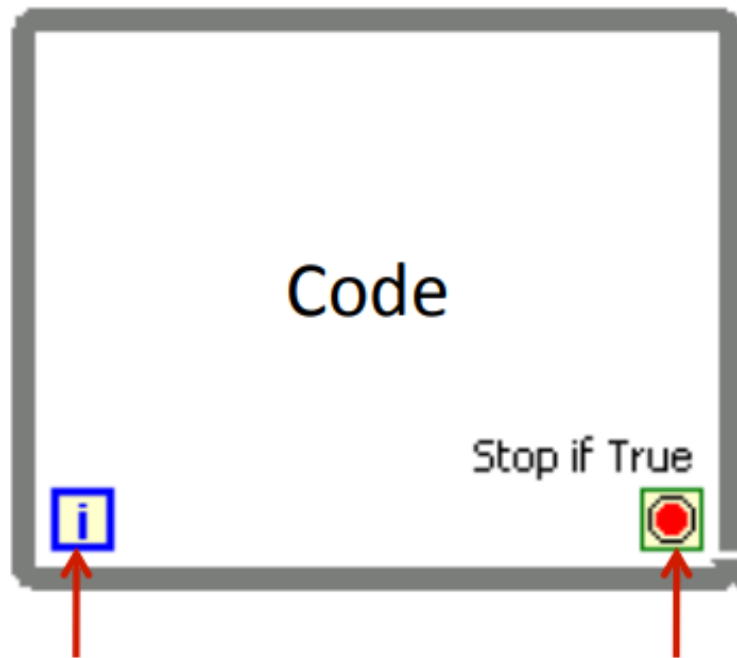
Block diagram



Loop structure

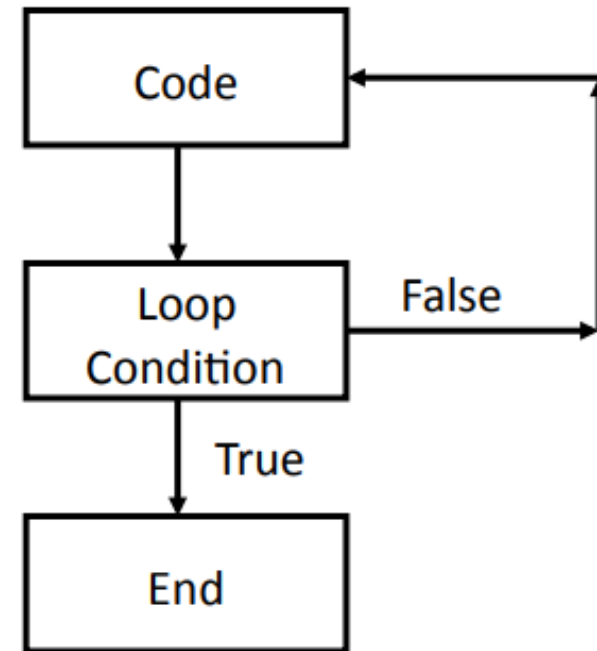


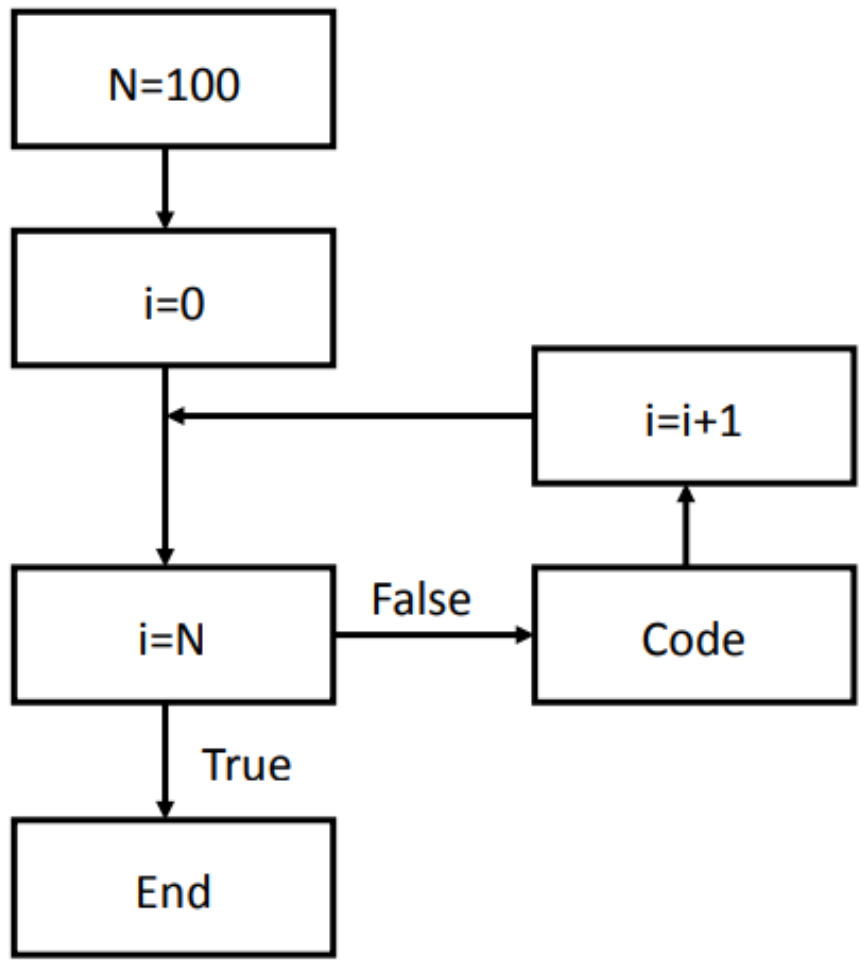
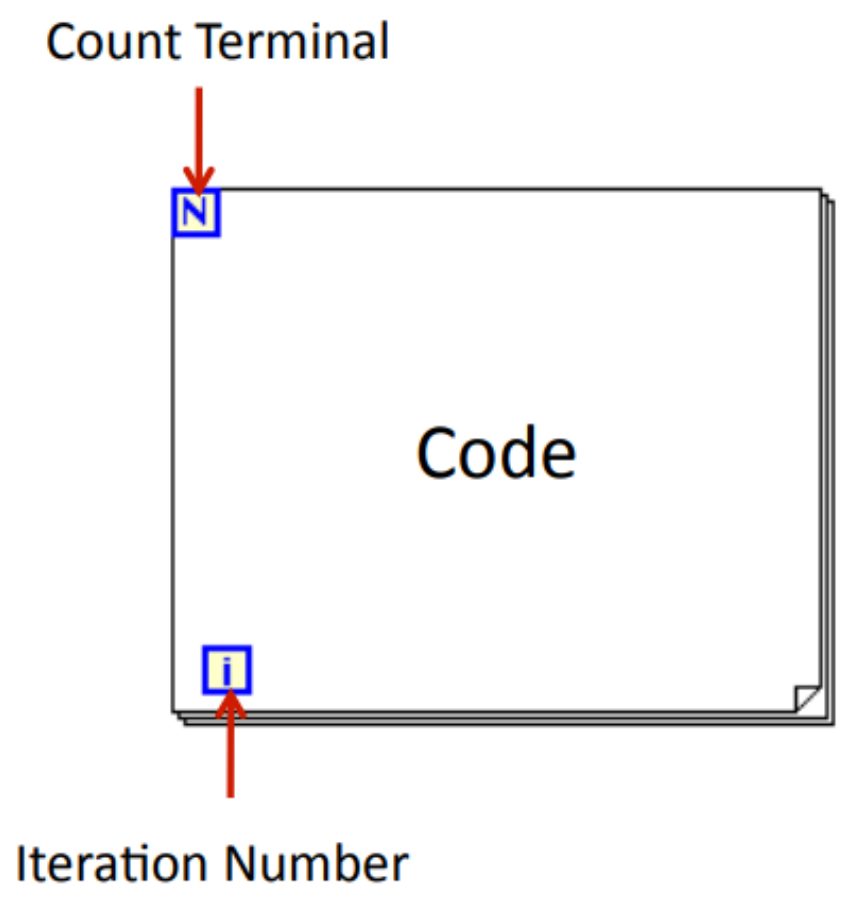
While Loop Structure



Iteration Number

Loop Condition



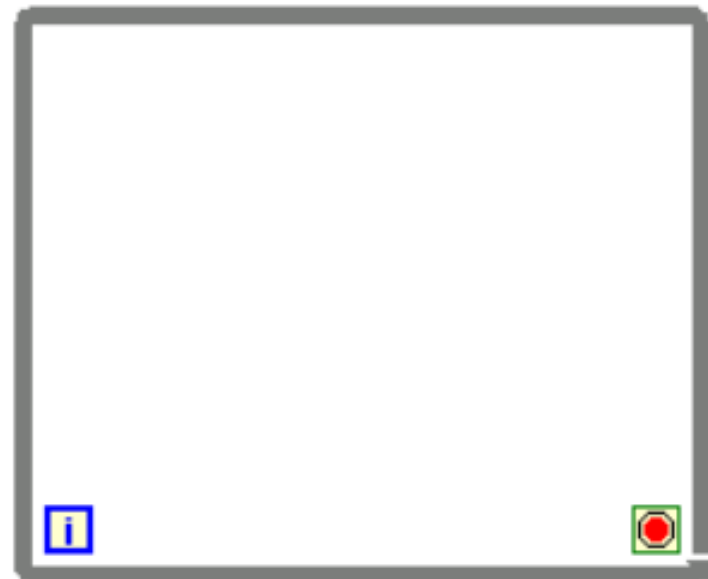




處理重複的問題

內部程式最少執行0次

已知執行次數



處理重複的問題

內部程式最少執行1次

已知停止條件

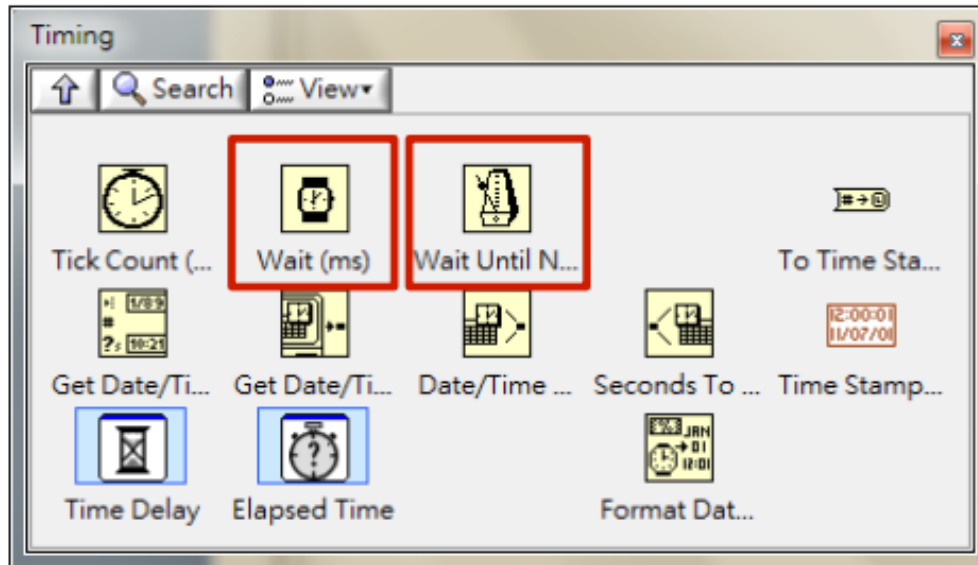
Shift register



Shift register



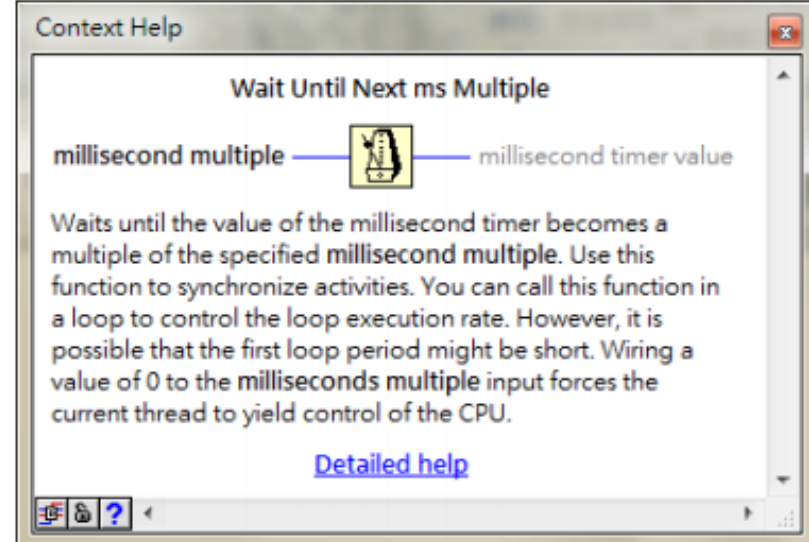
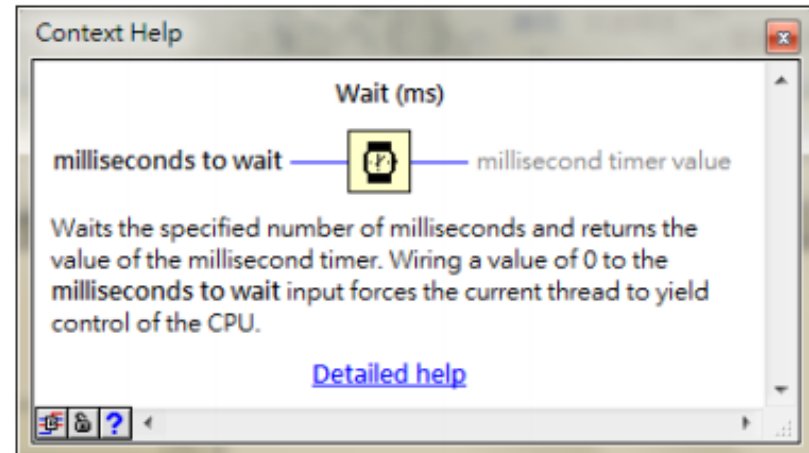
Time delay



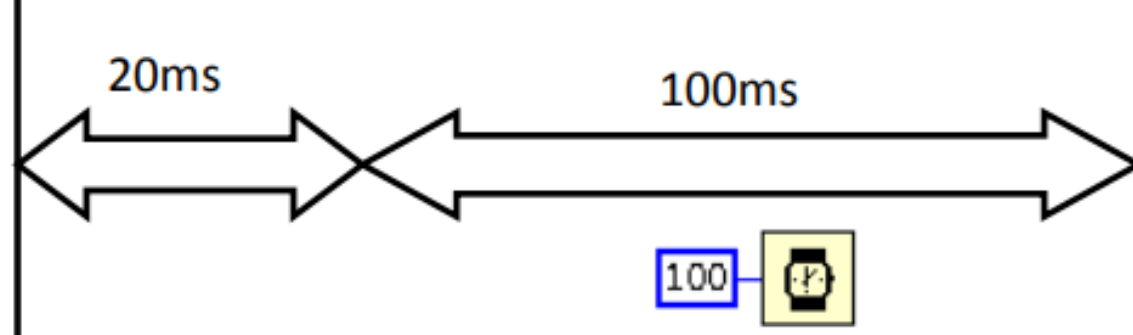
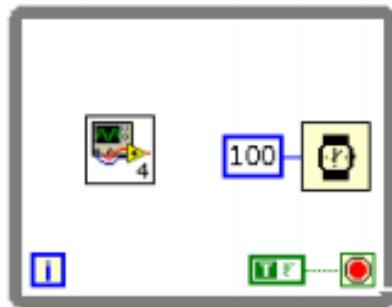
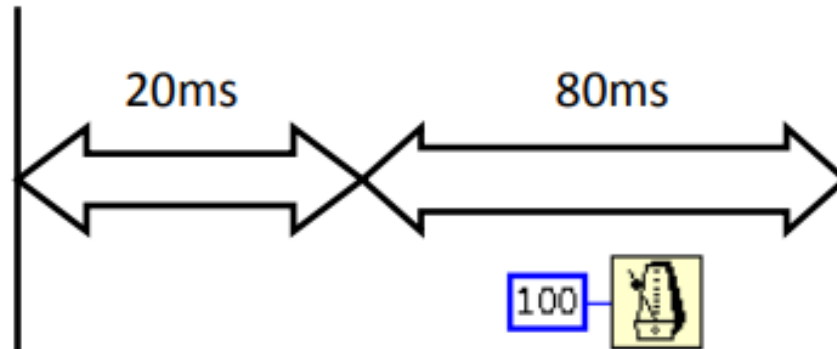
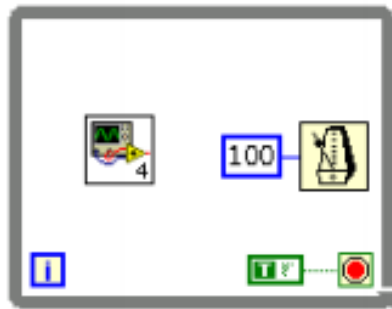
Wait (ms)



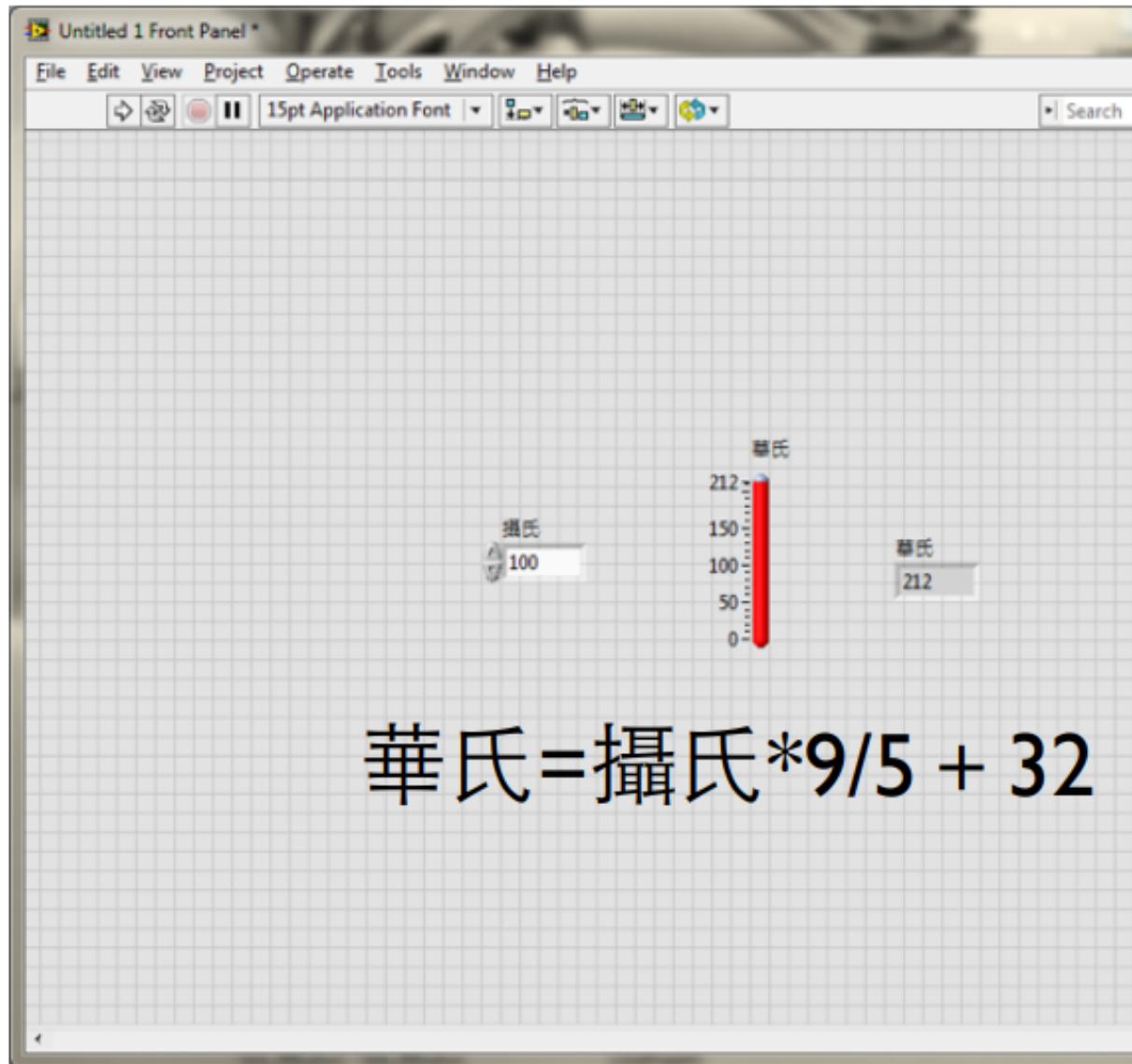
Wait Until Next ms Multiple



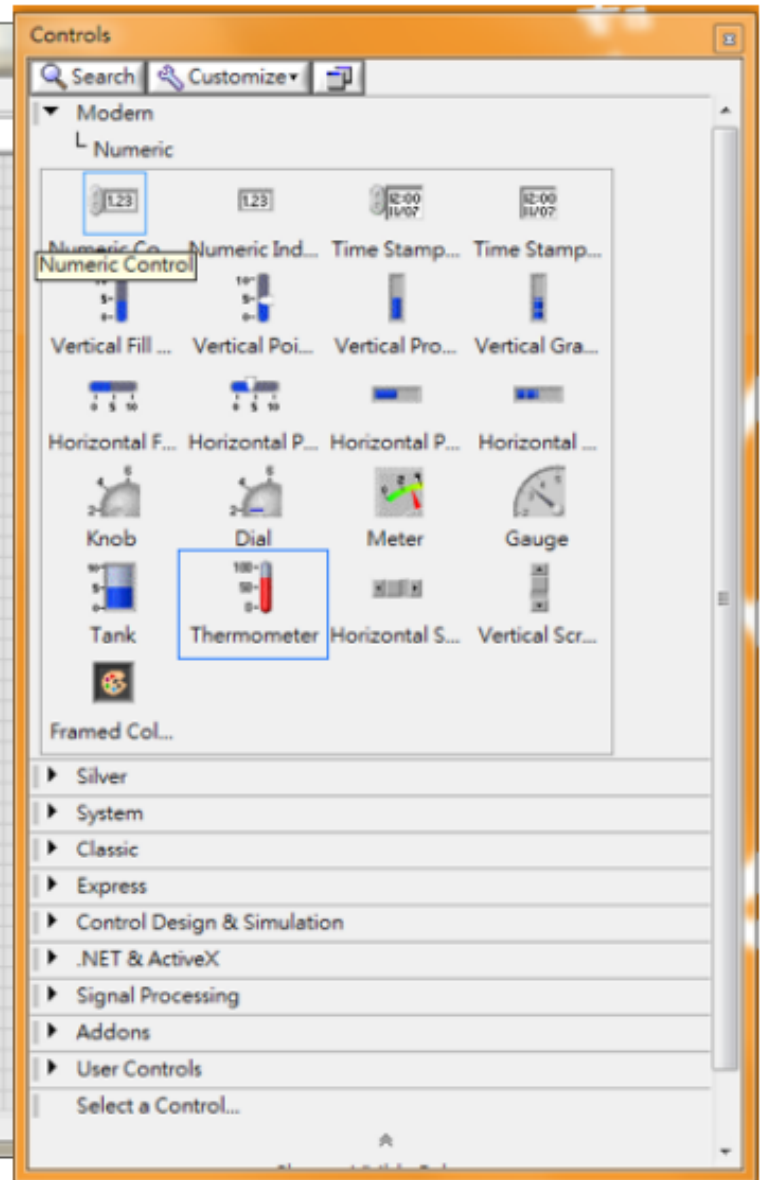
Time delay



練習一：溫度轉換

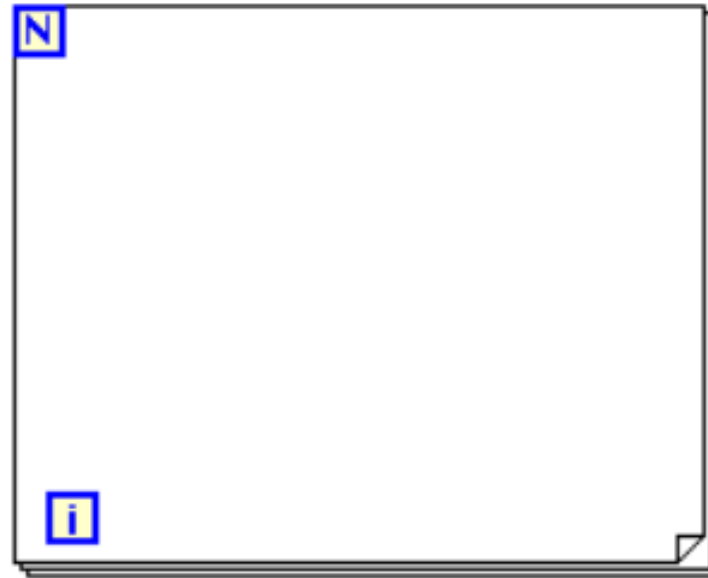


$$\text{華氏} = \text{攝氏} * 9/5 + 32$$



練習二：數字連加

- 練習使用 for loop 迴圈計算 $1+2+3+..+50$ 並將結果顯示在前列面板。



練習三：n!計算

- 練習使用 while loop 迴圈計算階乘並將結果呈現在前列面板。
- $n! = 1 * 2 * 3 * \dots * n$



練習四：圓與橢圓

- 熟悉圓形與橢圓形的公式，並利用公式畫出圖形，且可改變半徑以及半長軸。

圓： $x^2 + y^2 = R^2$

橢圓： $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

- **Hint:** XY Graph

作業繳交方式

- 繳交時間: 3/12 12:00 助教課
- 繳交方式: 整個Project跟所有的vi都放在資料夾下，資料夾取名為學號。
- 遲交扣分方式: 一天分數*90%、2天80%、3天70%、超過4天0分

- 有任何問題至820詢問或直接Email我:
- Email: f105601043@g.ncu.edu.tw