

## 電腦語言

C++(50%), C, Java,

Pascal, Basic, Fortran, Cobol

Visual Basic/C++/C#

Prolog / Lisp

SQL

**低階:** 二進制碼 / 機器碼 Machine code, 匯編語言 Assembly Language

**高階:** C#/C/C++, Java, Pascal, Basic, Visual Basic, Fortran, Cobol

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(1) test.c (小寫)

```
#include <stdio.h>
main(){
    int age;
    scanf("%i", &age);
    printf("age = %i \n", age);
}
```

C & C++

(2) test.cpp (C++)

```
#include <iostream>
using namespace std;
main(){
    int age;
    cin >> age;
    cout << "age = " << age << endl;
}
```

2

```
#include <iostream.h>
int add (int x, int y){
    return x+y;
}
int add (int x, int y, int z){ // overloading
    return x+y+z;
}
main(){
    int a=4,b=6,c=10;
    cout << add(a,b) << "," << add(a,b,c) << endl;
}
```

C++

```
class polynomial{
    protected:
        int n;
        double *a;

    public:
        polynomial(){}; .....; // constructor
        ~polynomial(); // destructor

    //member functions ...
};
```

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// Java

[http://en.wikipedia.org/wiki/Java\\_\(programming\\_language\)](http://en.wikipedia.org/wiki/Java_(programming_language))

```
public class Greetings
{
    public static void main (String[] args)
    {
        int n=7;
        System.out.println ("Hello, Chan" +n);
        System.out.println ("Congratulations!");
    }
}
```

Java Virtual  
Machine (JVM)  
跨平台

[http://en.wikipedia.org/wiki/Pascal\\_\(programming\\_language\)](http://en.wikipedia.org/wiki/Pascal_(programming_language))

```
PROGRAM pascal_program;
CONST MAX=52;

VAR    card : ARRAY[1..MAX] OF INTEGER;
        i : INTEGER;
        name: STRING[20];

BEGIN
    WRITELN ('輸入姓名: ');
    READLN (name);
    WRITELN ('你好, ', name);

END.
```

Object Pascal  
→ Delphi

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## BASIC (初學者)

<http://en.wikipedia.org/wiki/BASIC>

```
10 INPUT "What is your name: ", U$
20 PRINT "Hello "; U$
30 INPUT "How many stars do you want: ", N
40 S$ = ""
50 FOR I = 1 TO N
60 S$ = S$ + "*"
70 NEXT I
80 PRINT S$
```

```
90 INPUT "Do you want more stars? ", A$
100 IF LEN(A$) = 0 THEN GOTO 90
110 A$ = LEFT$(A$, 1)
120 IF A$ = "Y" OR A$ = "y" THEN GOTO 30
130 PRINT "Goodbye "; U$
140 END
```

執行程式  
直至有錯，或完結

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```
Sub insertPhotos()          ' Word巨集
    Dim Path As String
    Dim ClassName As String
    Dim ClassSize As Integer
    Dim i As Integer
    Dim ClassNo As String
    Dim FileName As String

    Path = InputBox("例如：C:\Photo", "請輸入相片檔案路徑")
    ClassName = InputBox("例如：1A, 1B...", "請輸入班別名稱")
    ClassSize = InputBox("例如：38, 40...", "請輸入班別人數")

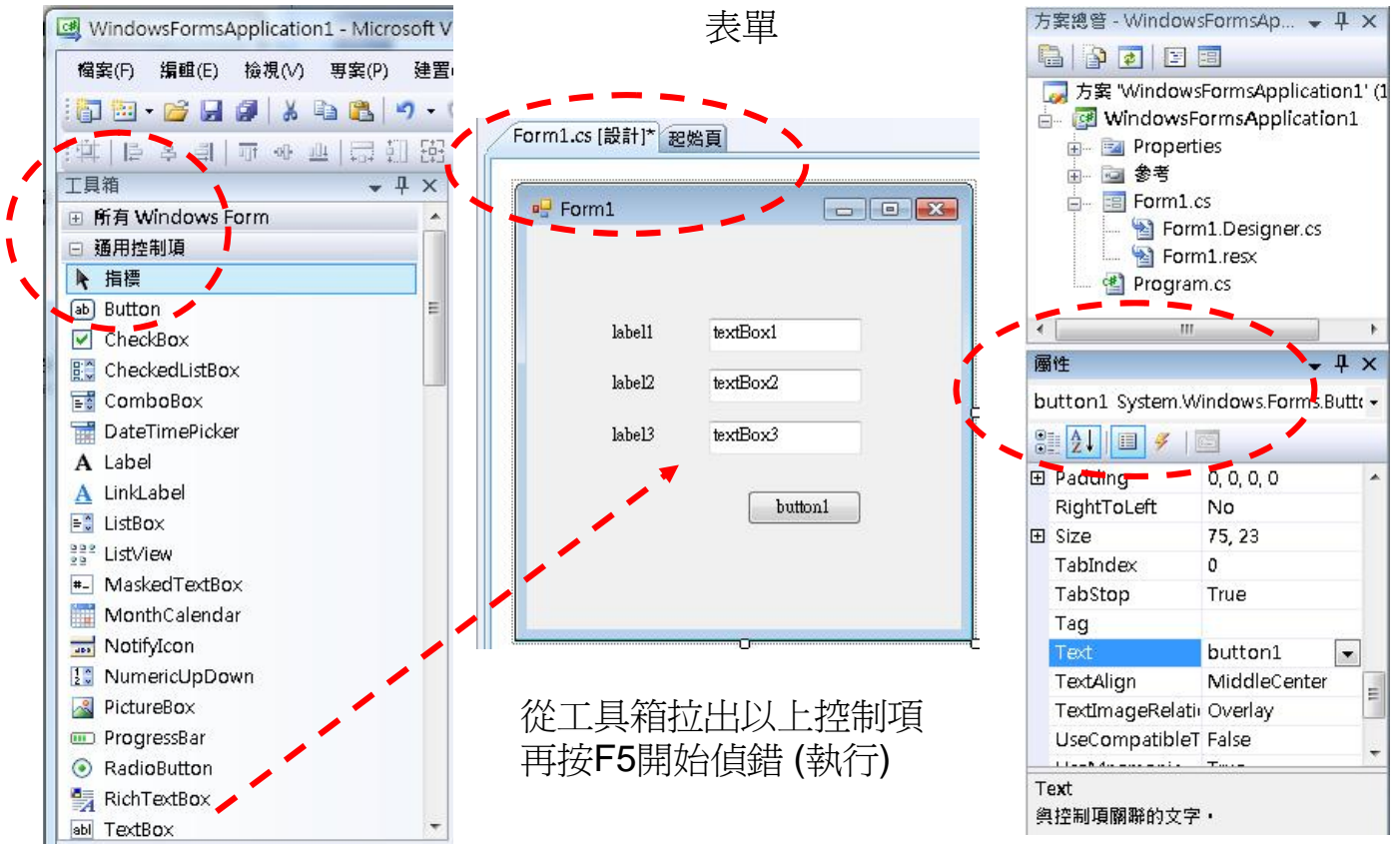
    For i = 1 To ClassSize
        ClassNo = Mid(Str(i), 2)
        FileName = Path + "\" + ClassName + "\" + ClassName + ClassNo + ".JPG"

        Selection.InlineShapes.AddPicture FileName:=FileName, _
            LinkToFile:=False, SaveWithDocument:=True
        Selection.MoveDown Unit:=wdLine, Count:=1
    Next
End Sub
```

Microsoft Office  
VBA

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表單



從工具箱拉出以上控制項  
再按F5開始偵錯 (執行)

Fortran: Formula Translator 科學方面

```

C AREA OF A TRIANGLE - HERON'S FORMULA
C INPUT - CARD READER UNIT 5, INTEGER INPUT,
C NO BLANK CARD FOR END OF DATA
C OUTPUT - LINE PRINTER UNIT 6, REAL OUTPUT
C INPUT ERROR DISPAYS ERROR MESSAGE ON OUTPUT
501 FORMAT(3I5)
601 FORMAT("A=",I5,"B=",I5,"C=",I5,"AREA= ",F10.2,"UNIT")
602 FORMAT("NORMAL END")
603 FORMAT("INPUT ERROR OR ZERO VALUE ERROR")
  INTEGER A,B,C
 10 READ(5,501,END=50,ERR=90) A,B,C
  IF(A=0 .OR. B=0 .OR. C=0) GO TO 90
  S = (A + B + C) / 2.0
  AREA = SQRT(S*(S-A)*(S-B)*(S-C))
  WRITE(6,601) A,B,C,AREA
  GO TO 10
50 WRITE(6,602)
  STOP
90 WRITE(6,603)
  STOP
  END
    
```

// 註釋

第7行

COBOL: 商業方面

```
B=A;
...
I=1;
```

```
MOVE A TO B
COMPUTE GROSS-PAY = HOURS-WORKED * HOURLY-RATE
SET I TO 1
```

```
If my-number is numeric
  continue
else
  display 'data field "my-number" is not numeric'
end-if
```

近似英文

```
Perform 6 times
  add 1 to I
end-perform
```

```
for (n=0;n<6;n++)
  I++;
printf ("Hello, World!");
```

```
DISPLAY "Hello, World!"
```

Prolog: (Logic) AI方面

Knowledge base 知識庫

```
parent(david, john).
parent(jim, david).
parent(steve, jim).
parent(nathan, steve).
```

```
父
Nathan
Steve
Jim
David
John
子
```

Rules 規則

```
grandparent(A,B):- parent(A,X), parent(X,B).
```

Query 查詢

```
?- grandparent(X,john).
```

Result 結果

```
X = JIM;
```

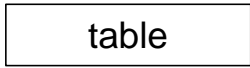
Back-Tracking  
(Sudoku, Chess, TicTacToe)

```
(defun init ()
  (set 'goal1
    '((on C table) (on B table) (on A B)
      (on E A) (on D table) (on F D) )) ; DF
                                        ; BAE
                                        ; C

  (set 'goal2
    '((on F table) (on A E) (on E A)
      (on C table) (on D table) (on B table) )) ; CBD
                                        ; BAE

  (set 'goal3
    '((on B table) (on A E) (on E A)
      (on C table) (on D table) (on B table) )) ; CBD
                                        ; BAE

  (set 'currentState
    '((on A table) (on B table) (on C B)
      (on D C) (on E table) (on F E) )) ; BCD
                                        ; EF
  )
```



```
(defun *remove (E L)
  (cond ((null L) NIL)
        ((equal E (car L)) (cdr L))
        (T (cons (car L)
                  (*remove E (cdr L))))))
```

...移動物件...達至goal1,goal2,goal3狀態

SQL: DataBase

資料表格: Books

BookNo	ISBN	Title	Author	Publisher	CD
F001	9620012348	C#3.0	Judith Bishop	O'Reilly	Y
F002	9620023455	PHP	Rasmus Lerdorf	O'Reilly	Y
F003	0764539671	Excel 2003 Bible	John Walkenbach	Wiley	Y
F004	047177197X	Flash8 AS Bible	Joey Lott	Wiley	N

資料表格: Students

StudentNo	Name	Class	ClassNo	Gender	Phone
1001	談文軒	5D	26	M	22334455
1002	徐柏熙	5D			
1003	王曉東	5D			
1004	黃皓君	5D			

```
select * from books, students, loan
where books.bookno=loan.bookno
and students.studentno=loan.studentno
and remarks="overdue"
order by students.studentno
```

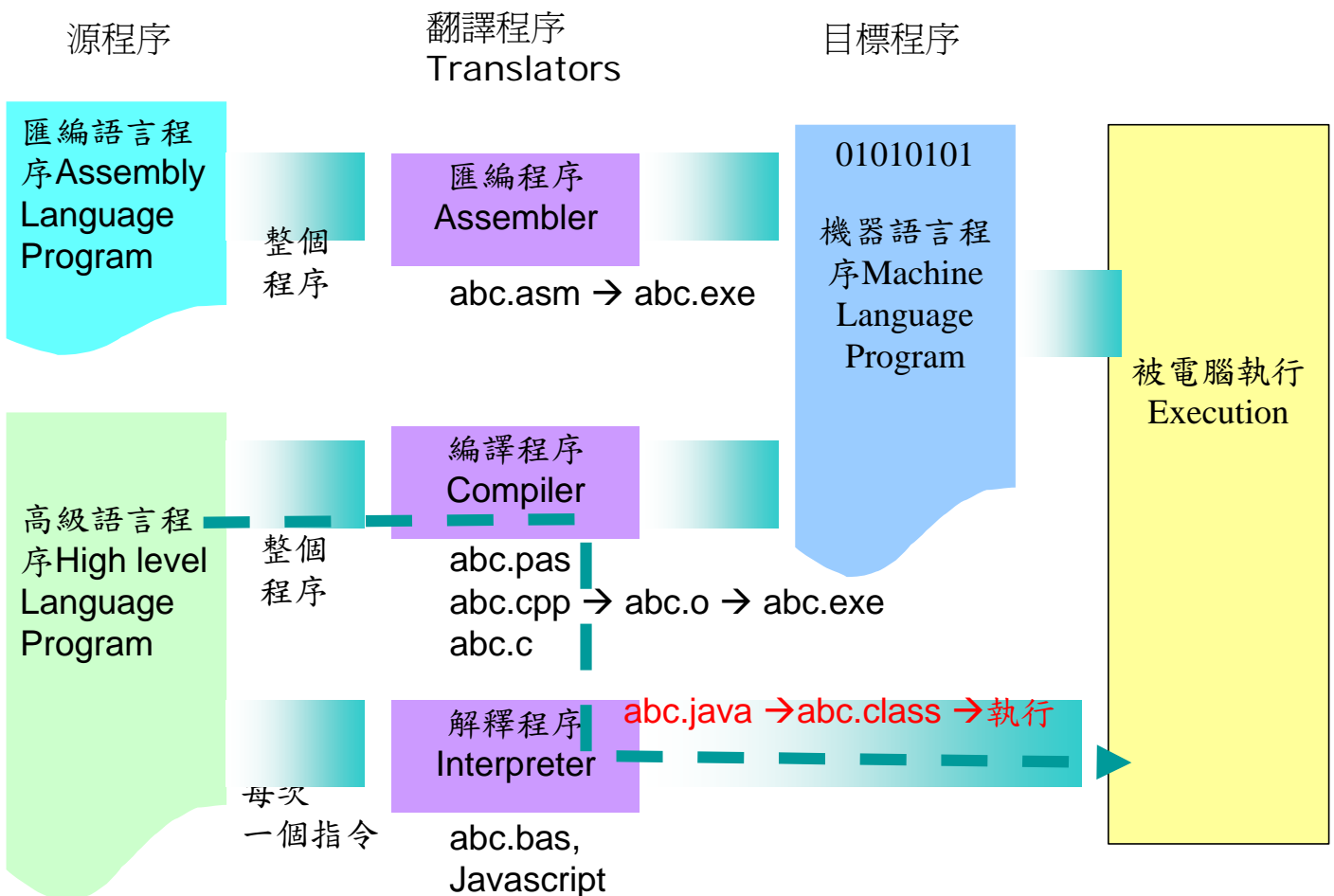
資料表格: Loan

RefNo	BookNo	StudentNo	IssueDate	DueDate	ReturnDate	Remarks
081234	F002	1002	3/9/2008	17/9/2008	-	overdue
081235	F004	1004	4/9/2008	18/9/2008	-	overdue
081236	F003	1003	5/9/2008	19/9/2008	15/9/2008	-

	源程序	翻譯程序Translators	目標程序
1	匯編語言程序	匯編程序Assembler	機器語言程序
2	高級語言程序	編譯程序 Compiler	目標/機器語言程序
3	高級語言程序	解釋程序Interpreter	直接被電腦執行

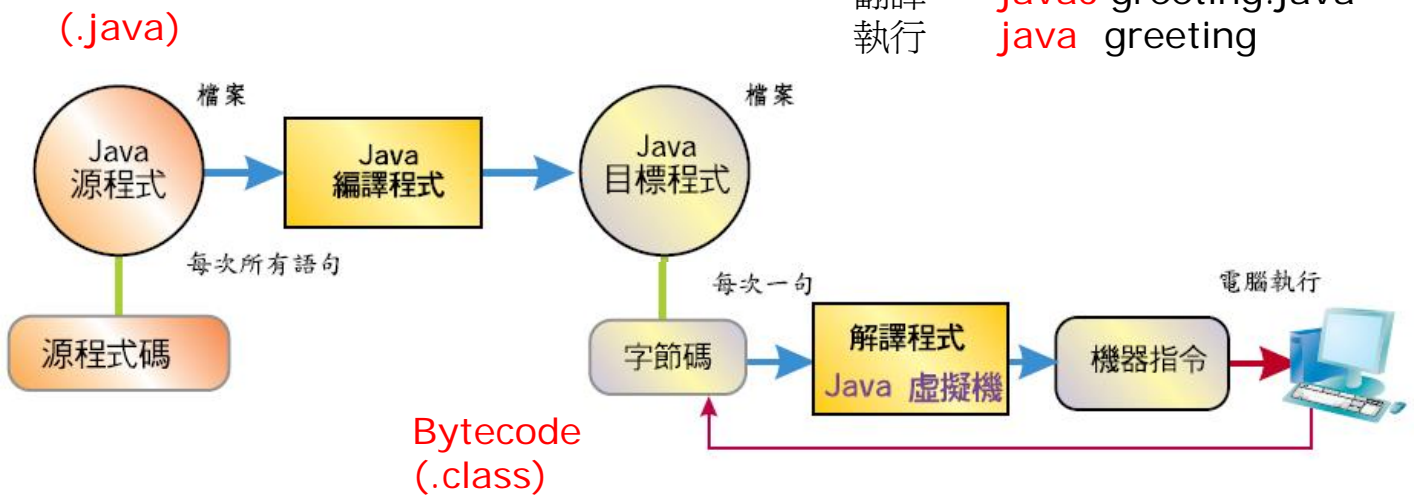
匯編器Assembler	編譯器Compiler	解譯器Interpreter
將低階語言翻譯	將高階語言，翻譯成機器語言	
產生稱為目標程式的新檔案	沒有新檔案產生	
程式執行速度較快	程式執行速度較慢	
一次過翻譯整個源程式	每次只翻譯一句語句，然後交由電腦執行	
對程式編寫員較為不方便。 每次源程式改變都需要重新進行編譯	對程式編寫員較為方便 適合初學者	
程式編寫員可以把源程式隱藏起來	執行時，需要源程式	
程式在執行時，毋需進行翻譯	執行時，必須進程式翻譯	

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翻譯 javac greeting.java  
執行 java greeting



### Java & class

<http://www2.hawaii.edu/~btimmerm/2003n4Fall/pa04/>

### Java Applet

#### 1. Linked List

<http://www.itu.dk/courses/SPT/E2009/anim/03-LinkList/>

#### 2. Equation solver

[http://www.fi.uu.nl/toepassingn/02017/toepassing\\_wisweb.en.html](http://www.fi.uu.nl/toepassingn/02017/toepassing_wisweb.en.html)

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### 趨勢 Trends:

#### a. 第四代語言 4GL

例如：`fopen (...);`  
`fgets (...)` ... `fclose (...)`

非以次序步驟為主 non-procedural，宣告語言 declarative  
更接近人類的自然語言 natural language  
程序編寫員只表明需要做『什麼』 WHAT to do，  
不用理會『怎樣』做 HOW to do  
只要有少量程序編寫知識及訓練，都可以編寫程序

例如：`select * from students where classno="5E" order by name`  
`insert into students values ("5E01","Chan Tai Man","M","L")`  
`delete from students where name="Chan Tai Man"`  
`update students set house="M" where classno="1A11"`

#### b. 未來趨勢

使用圖像化使用者介面 GUI，例如：Visual C#  
(正如使用 HTML 與 Dream Weaver / Front Page 編寫網頁)

程式更容易編寫

物件導向程序編寫語言 OOP，例如：Java, C++, C#, Delphi...

邏輯程序編寫語言 Logic programming (例如：Prolog)

應用於人工智能 Artificial Intelligence (AI) applications：

例如：專家系統 Expert System，

語言處理 Natural Language Processing，

醫學診斷 Medical Diagnosis

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